EXPOSING STAMP COUNTERFEITERS

JULY

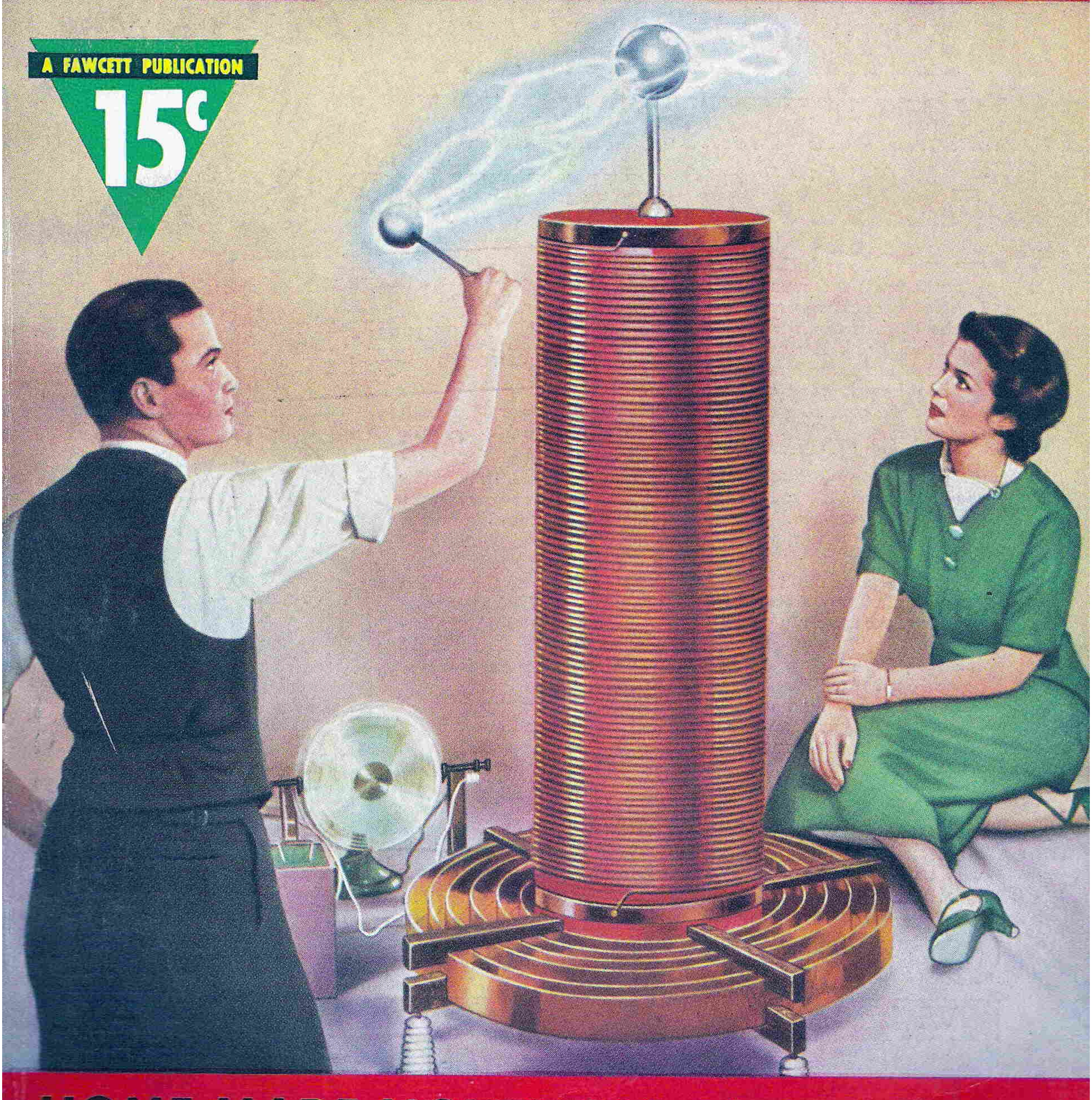
MODERN MECHANIX

HOBBIES AND INVENTIONS

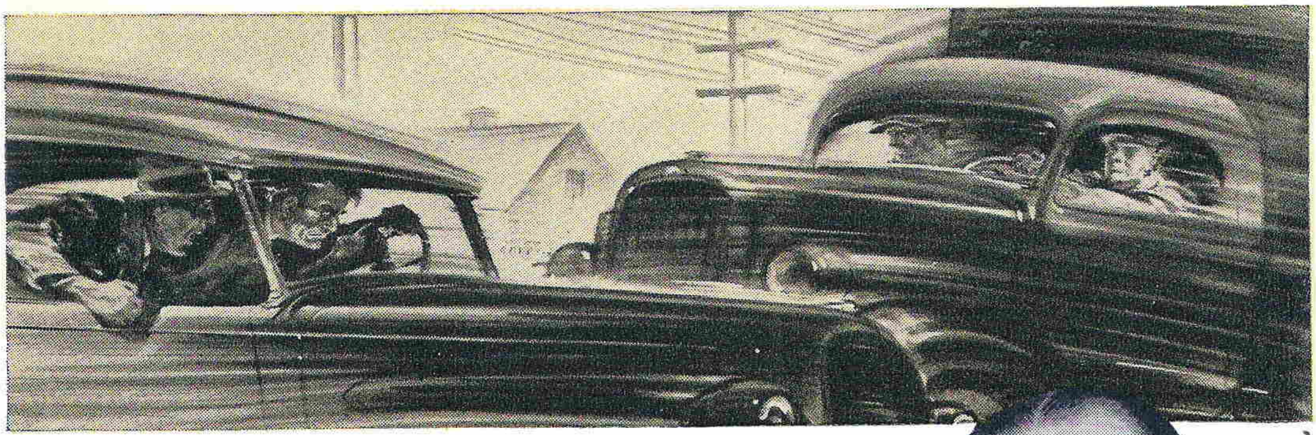
NSC

A FAWCETT PUBLICATION

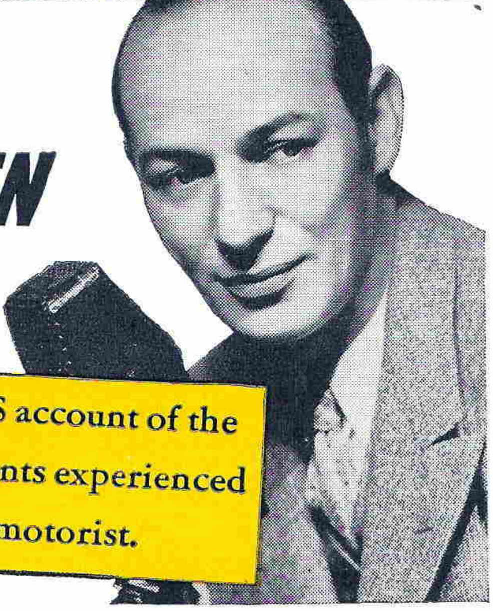
15c



HOME-MADE LIGHTNING—SEE PAGE 94



HE WAS HEADING FOR "HOME SWEET HOME" WHEN -BANG! A BLOW-OUT!



Read TED HUSING'S account of the terror-crowded moments experienced by a Chicago motorist.

TRAFFIC was heavy that blistering hot Summer afternoon as Mr. E. P. Keenan of Chicago, returning from a business trip, sped along Waukegan Road. His passenger did most of the talking. Mr. Keenan was too busy keeping one eye glued on the oncoming traffic in the other lane.

"We're making pretty good time," Keenan's pal said. He couldn't reach "Home Sweet Home" quickly enough.

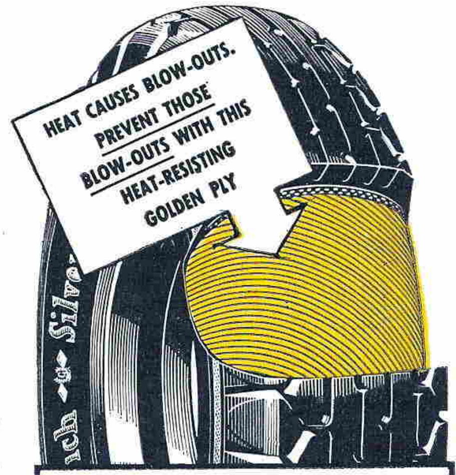
A Close Shave

Bang! Like a thunderbolt the staccato crack of a blow-out rose above the roar of the motor. In desperation he gave the steering wheel one final, frenzied tug. The car bolted—lurched to the right—and came to a stop at the brink of a deep ditch. They were safe—yes. But after that close call no wonder Mr. E. P. Keenan will tell you that he now "believes in miracles."

It took Goodrich engineers to fight this driving hazard for American motorists and provide them with a real defense against high-speed blow-outs. They invented the now famous Life-Saver Golden Ply which is found only in Goodrich Silvertown Tires. This remarkable Golden Ply is a layer of special rubber and full-floating cords, scientifically treated to resist internal tire heat. By resisting this heat, I am told, the Golden Ply keeps rubber and fabric from separating—keeps blisters from forming. Thus the blow-out that might have been, never gets a start.

Are Your Tires Safe?

You can bet your bottom dollar that Mr. E. P. Keenan of Chicago, is now riding on Silvertowns. My advice to every motorist who has his own and his family's safety at heart is to see these life-saving tires at any Goodrich Silvertown Store or Goodrich Dealer's. The sooner the *safer.*


HEAT CAUSES BLOW-OUTS.
PREVENT THOSE BLOW-OUTS WITH THIS HEAT-RESISTING GOLDEN PLY
Silvertown

FREE! Millions have joined the Silvertown Safety League—pledged to drive safely. See your Goodrich dealer and join now. Nothing to buy. He'll get for you FREE a handsome emblem with red crystal reflector to protect you if your tail light fails.

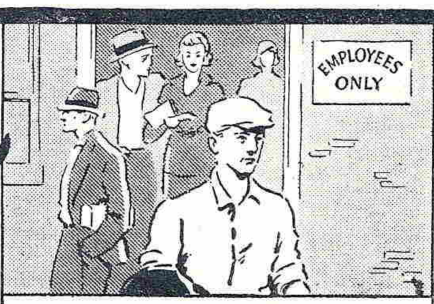
Goodrich SAFETY Silvertown

With Life-Saver Golden Ply Blow-Out Protection

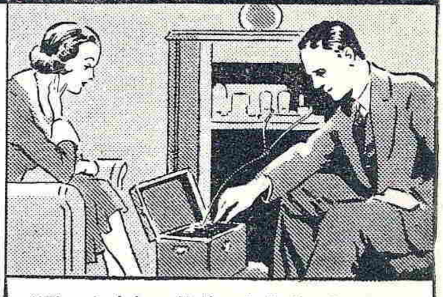
I jumped from $18 a week to $50 -- a Free Book started me toward this GOOD PAY IN RADIO

HERE'S How it Happened

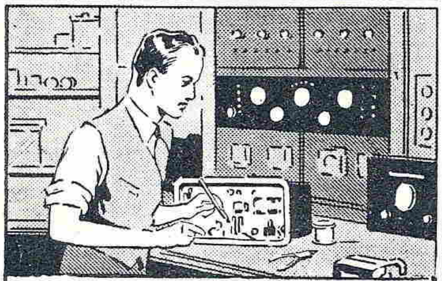
by S. J. E.
(NAME AND ADDRESS SENT UPON REQUEST)



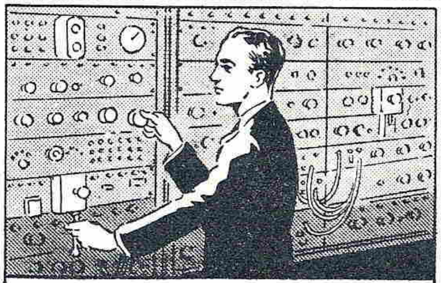
"I had an $18 a week job in a shoe factory. I'd probably be at it today if I hadn't read about the opportunities in Radio and started training at home for them."



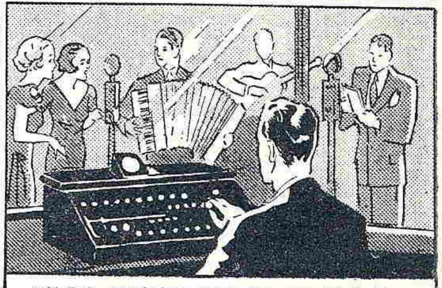
"The training National Radio Institute gave me was so practical I was soon ready to make $5, $10, $15 a week in spare time servicing Radio sets."



"When I finished training I accepted a job as serviceman with a Radio store. In three weeks I was made service manager at more than twice what I earned in the shoe factory."



"Eight months later N.R.I. Employment Department sent me to Station KWCR as a Radio operator. Now I am Radio Engineer at Station WSUI. I am also connected with Television Station W9XK."



"N.R.I. Training took me out of a low-pay shoe factory job and put me into Radio at good pay. Radio is growing fast. The field is wide open to properly trained men."

J. E. SMITH,
President,
National Radio Institute.
Established 1914

Find out today how I Train You at Home to BE A RADIO EXPERT

Many Make $30, $50, $75 A Week

Do you too want a better job? Do you too want to make more money? Radio offers many spare time and full time opportunities for good pay.

Get Ready Now For Jobs Like These

Broadcasting stations employ engineers, operators, station managers and pay up to $5,000 a year. Spare time Radio set servicing pays many $200 to $500 a year—full time servicing jobs pay many $30, $50, $75 a week. Many Radio Experts are operating full or part time Radio businesses. Radio manufacturers and jobbers employ testers, inspectors, foremen, engineers, servicemen, paying up to $6,000 a year. Radio operators on ships get good pay, see the world. Automobile, police, aviation, commercial Radio, loud speaker systems, offer good opportunities now and for the future. Television promises good jobs soon. Men I trained have good jobs in these branches of Radio.

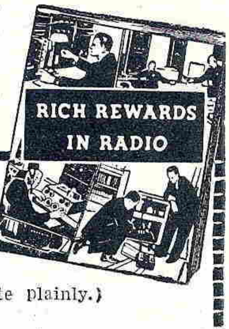
Many Make $5, $10, $15 a Week Extra In Spare Time While Learning

The day you enroll I start sending you Extra Money Job Sheets. They show you how to do Radio repair jobs; how to cash in quickly. Throughout your training I send plans and ideas that made good spare time money—from $200 to $500 a year—for hundreds of fellows. I send special Radio equipment, give you practical Radio experience—show you how to conduct experiments, build circuits illustrating important Radio principles.

Find Out What Radio Offers You

Mail the coupon now for "Rich Rewards in Radio." It's free to any fellow over 16 years old. It points out Radio's spare time and full time opportunities, also those coming in Television; tells about my Training in Radio and Television; shows you 131 letters from men I trained, shows what they are doing, earning; shows my Money Back Agreement. MAIL COUPON in an envelope, or paste on penny post card—NOW!

J. E. SMITH, President, Dept. 7GH, National Radio Institute, Washington, D. C.



J. E. Smith, President, Dept. 7-GH,
National Radio Institute, Washington, D. C.

Dear Mr. Smith: Without obligating me, send "Rich Rewards in Radio," which points out spare time and full time opportunities in Radio, and explains your practical method of training at home in spare time to become a Radio Expert. (Please write plainly.)

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Address ....

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MODERN MECHANIX

JULY
1937

Volume XVIII
Number 3

Circulation over 250,000

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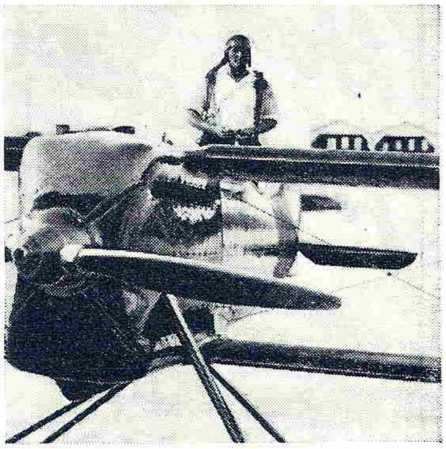

Whizzing through the air at 440.68 m. p. h., Lieut. Francesco Angello, Italian ace, set a world's speed record for aircraft on Oct. 23, 1934. Today, Premier Mussolini orders his airmen to build planes that will attain speeds of 600 m. p. h.! Whether or not aircraft will be able to reach such startling speeds is explained in an interesting article—"Is There a Speed Limit?"—written by Don Glassman, appearing in the August issue of MM. The photo above shows Major Alford Williams, noted American speed pilot, in the cockpit of a former Schneider Trophy racing seaplane.

FOR WORKSHOP FANS

Among the many interesting projects included in the August issue will be—the first installment of Amateur Telescope Making; Experiments For The Amateur Physicist; A ¾-Meter Radio Receiver; Making A Rain Gauge; concluding installment of Build A Bellanca "Gas" Model Plane, and other plans, suggestions, and practical workshop kinks.

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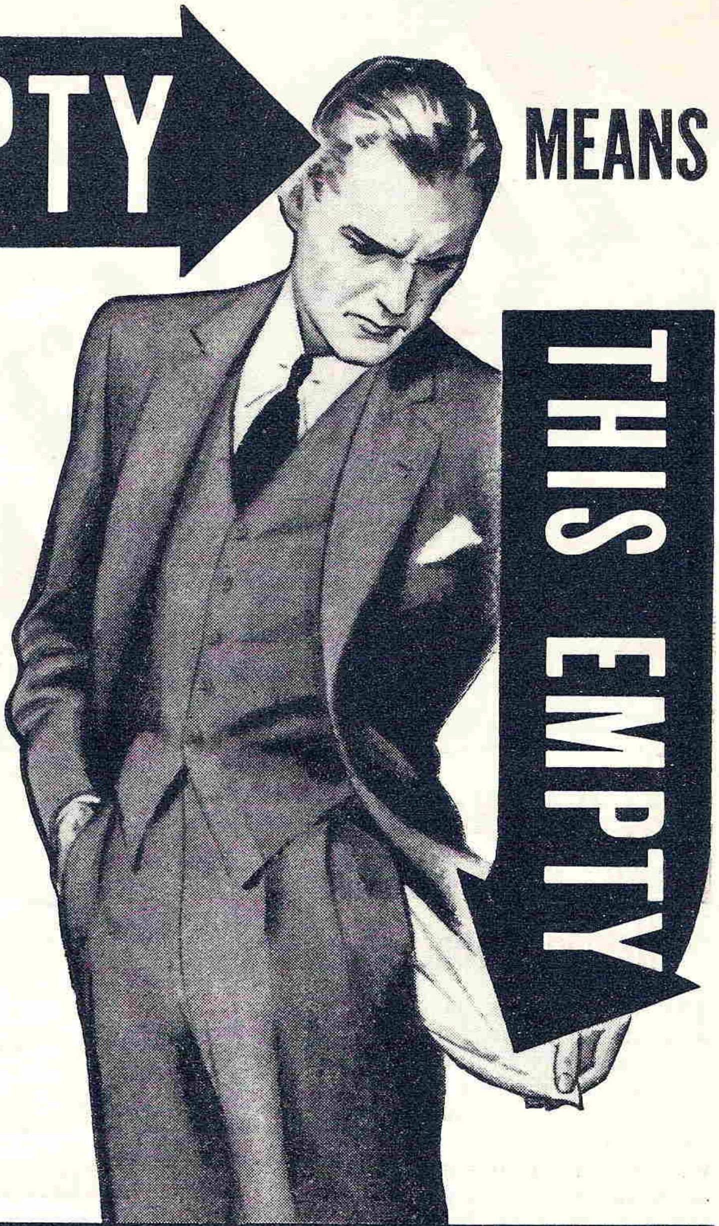
THIS EMPTY MEANS THIS EMPTY



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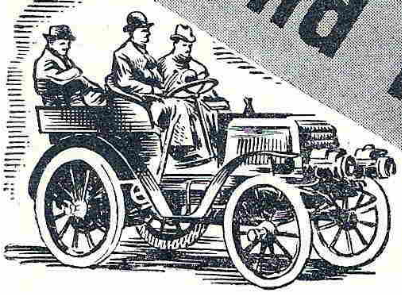
David Sarnoff says:

INVENTORS

Send For Valuable Facts *about*

DAVID SARNOFF, once a poor lad and now the famous President of the Radio Corporation of America, in an article in Liberty Magazine states: "Civilization means elimination of unnecessary labor. The sewing machine and the vacuum cleaner save millions of women from backbreaking toil. The tractor makes the farmer's life bearable. The automobile lends wings to us all. The airplane is our magic carpet. It would be madness to slow up invention because our trouble is not that mechanical science moves too speedily, but that the governmental and social sciences move too slowly . . . In a world reorganized to vibrate within certain wave bands, human intelligence will be able to distribute equally nature's bounties from above and below, and make princes of paupers."



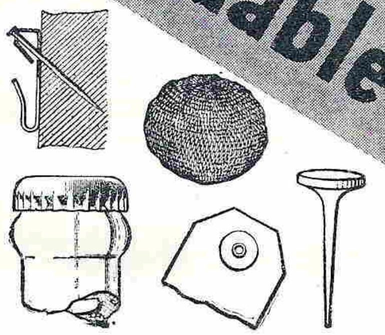
Since the "Horseless Buggy" Days, We Have Helped Inventors

PERHAPS you have already heard about our firm, because one client tells another—and we have served men in every state in the Union, and in nearly every foreign country. We have been working with inventors since 1898. If you have a good invention—or an idea for one—and don't know what Victor J. Evans & Co. can do for you, NOW is the time to find out.

How We Can Help You

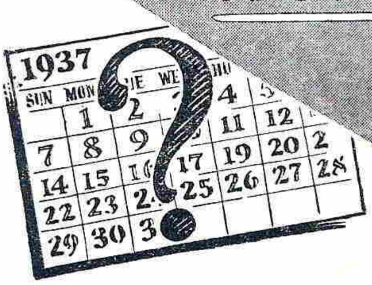
Both the Patent Office and the U. S. Supreme Court have made it clear that the inventor needs the assistance of a competent patent lawyer when it comes to protecting an invention. It is one thing to think up a good invention—it is another to get effective patent protection on it.

For more than a third of a century—it has been our business to give sound advice and counsel to inventors. Our free books (described on the opposite page) tell what steps to take first, how to protect yourself, how the laws protect you, what you must do, when to offer your invention for sale, how others have succeeded, and much more. You need this information.



Simple Inventions May Have Excellent Commercial Possibilities

FREQUENTLY inventors confuse the size of the complication of a device with the question of commercial value and patentability. These two factors, of course, have no relation to each other. Most of our present-day complicated machines represent a process of evolution, a series of inventions. On the other hand, every so often some inventor comes along with a very simple "gadget" which possesses the elements of broad utility and is patentable. Some of the most profitable inventions have been of this latter class. Shown above are a few such examples. Whether a device is simple or complex, if it represents a forward step to save manufacturing costs, to save labor, or to add enjoyment to human life, it may prove patentable and profitable. This subject is more fully discussed in the booklet entitled "Patent Protection" shown on the opposite page.



What Will Be Next?

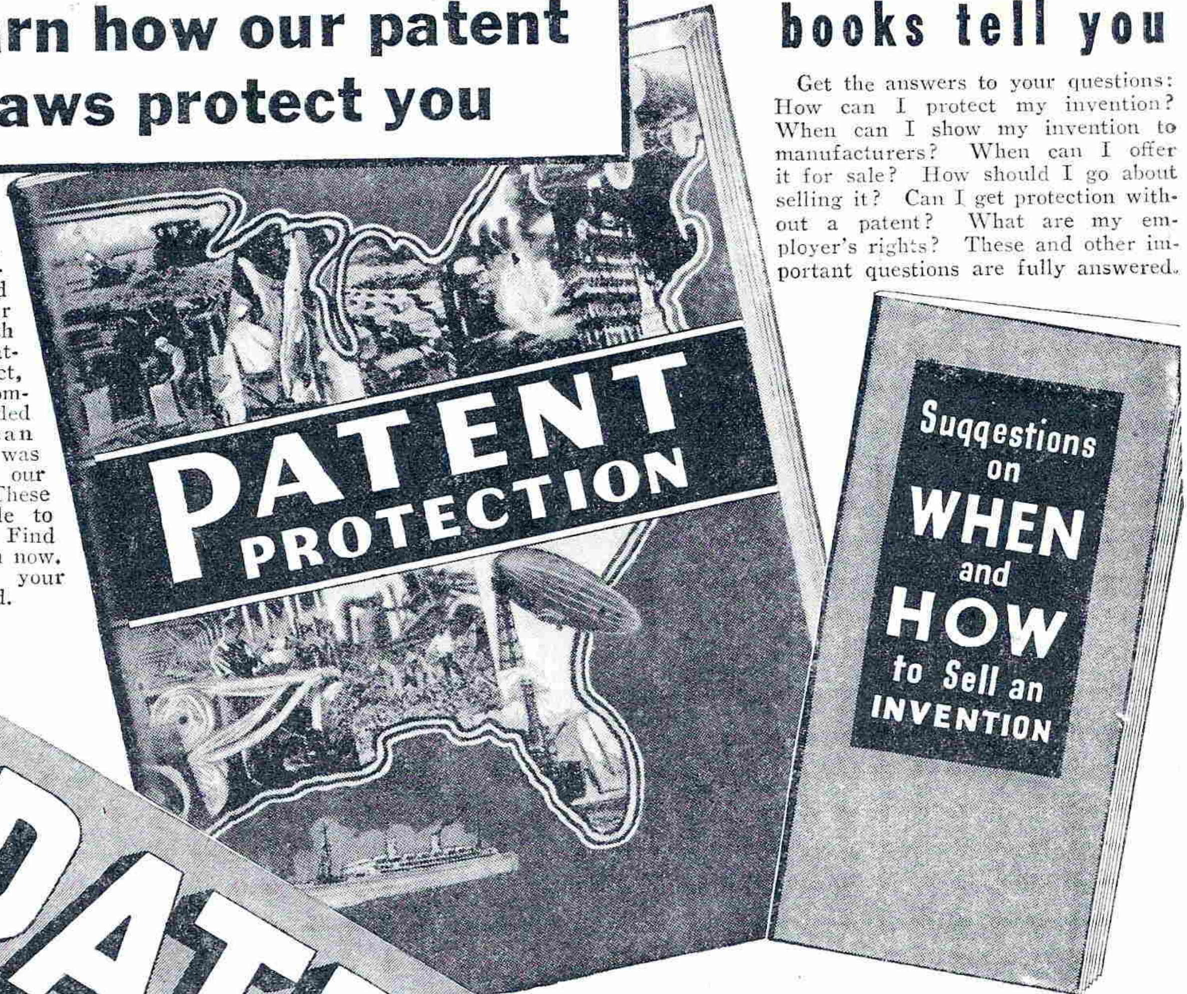
EVER since George Washington signed the first patent, America has led the world in inventions. It may be said that not a year has gone by without some important inventions being patented and commercialized. David Sarnoff, president of the Radio Corporation of America, sees a big future ahead for science and invention. Just as sure as the sunrise, 1937 will see new inventions come out—new wealth made from patents. Your idea may be one of them. You never can tell. For this reason you should send for our books today and get the facts about patents and inventions.

Learn how our patent laws protect you

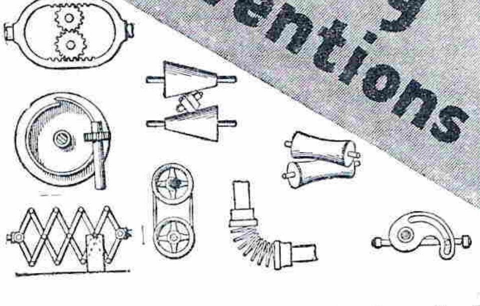
The U. S. has liberal patent laws, and much of our national wealth is based on patents. In fact, a Japanese commission decided that American progress was mainly due to our patent laws. These laws are made to protect you. Find out about them now. This is for your own good.

These FREE books tell you

Get the answers to your questions: How can I protect my invention? When can I show my invention to manufacturers? When can I offer it for sale? How should I go about selling it? Can I get protection without a patent? What are my employer's rights? These and other important questions are fully answered.


PATENT PROTECTION
Suggestions on WHEN and HOW to Sell an INVENTION

PATENTS and Selling Inventions



115 Mechanical Principles Shown

Request the book "Patent Protection" (sent free to inventors). Not only does it tell you what to do for protection, and how to do it—it also shows you 115 different mechanical movements that you may use in developing your own inventions. Inventors tell us they have found these useful.

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Delays are dangerous. If you have a good invention you should get protection for it just as soon as possible. Don't turn this page until you have clipped and mailed this coupon—you will hear from us by return mail.

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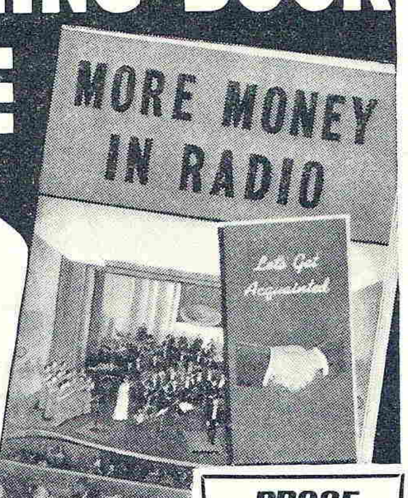

Shows How to Make $15 to $25 weekly in Spare Time $35 to $60 Full Time in Radio

PROOF

"The equipment you furnish is all a man needs to get a good start in the Radio business"—Successful Student, **H. S. Hall**, Baltimore, Md.

Do you know that ambitious men are making good money in Radio—that many are earning $10 to $25 in a week in their SPARE TIME—that even a cripple in a wheel chair is making a good living in Radio? Do you realize that YOU too can cash in fast? This is a FACT, and I prove it in my free book.

PROFIT BY MY NEW TRAINING

Twenty-five million Radio sets in this country require service and parts—just like autos. With my training a man can make from $5 to $25 a week in spare time. From good spare-time earnings you can quickly step into a business of your own, or a full-time job at good pay. I train you right in your own home—teach you Radio thoroughly—furnish you a big professional outfit—and give you my "Business Builders" showing how to make the money. Earn while you learn. Fit yourself for a better job. Get the FACTS! Send for my FREE BOOK today! **F. L. Sprayberry**, Pres., Sprayberry Academy of Radio.

READ THIS!

This is no ordinary "correspondence course." I furnish you with a complete PROFESSIONAL RADIO outfit — exactly what you will find on any service-man's workbench: Genuine tester. Big set of manuals. Complete tools. Extra parts. Even an "Electric Eye"!

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F. L. SPRAYBERRY, SPRAYBERRY ACADEMY OF RADIO, Office No. 15-H, University Place, N. W. WASHINGTON, D. C.

Please send me, without obligation, "More Money in Radio" and complete facts about your new type of training.

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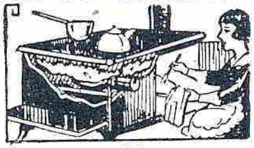

COOLER KITCHEN IN *SUMMER*

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Business Demands Accountancy

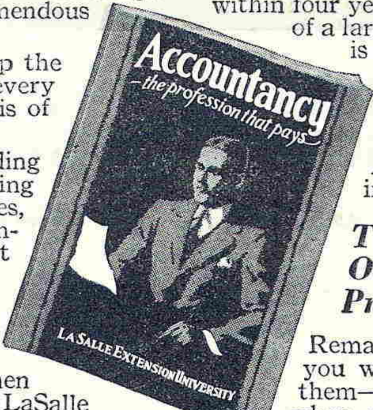
—because Accountants Command Business

ACCOUNTANTS have been in demand—at far better than average earnings.

But today—more than ever before—the competent accountant finds his services at a tremendous and increasing premium.

In the depression business tightened up the reins and is watching costs—prices—every move—striving to operate on that basis of close control so essential to profits.

Then too, progressive business is building now for the return of prosperity—laying plans for expansion, for new processes, new markets—getting ready for the unparalleled opportunities of the next ten years.



The Home Study Way to Accountancy Success

Thousands upon thousands of men have trained for Accountancy with LaSalle—at night—at home.

Their success—their progress—is a matter of record.

Whether their goal was a C. P. A. degree or advancement in business, our files are full to overflowing with letters reporting income increases so far out of line with the time and cost investment that there is no comparison.

Note, for instance, these four typical cases chosen out of thousands more we might cite. (Names on request.)

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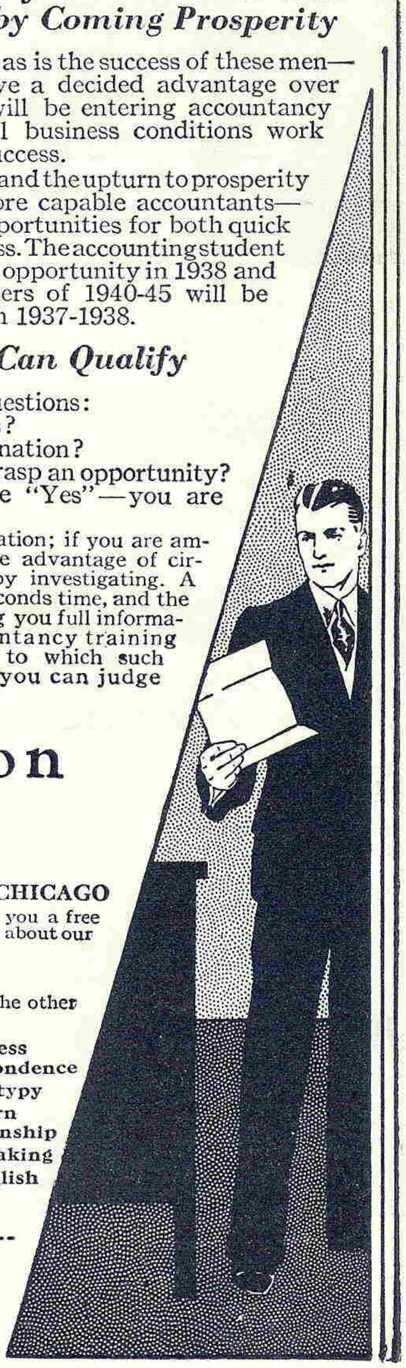

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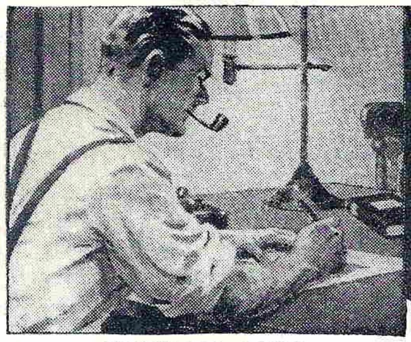

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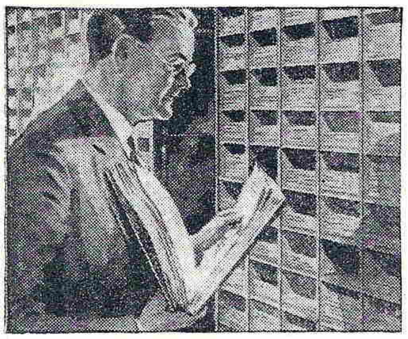

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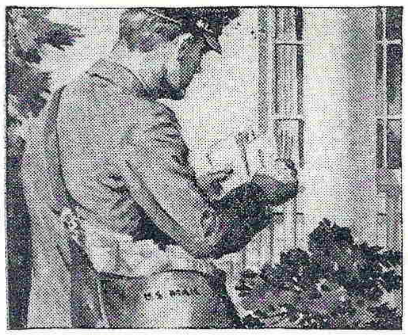

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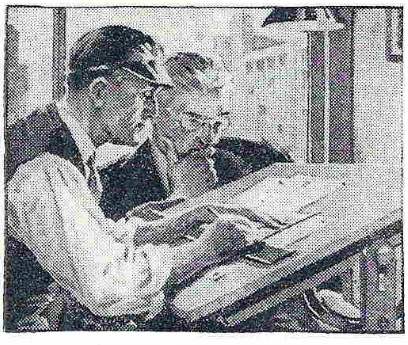

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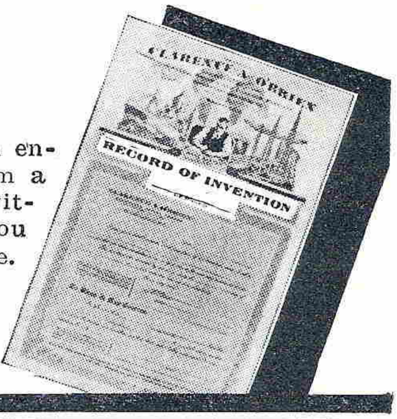

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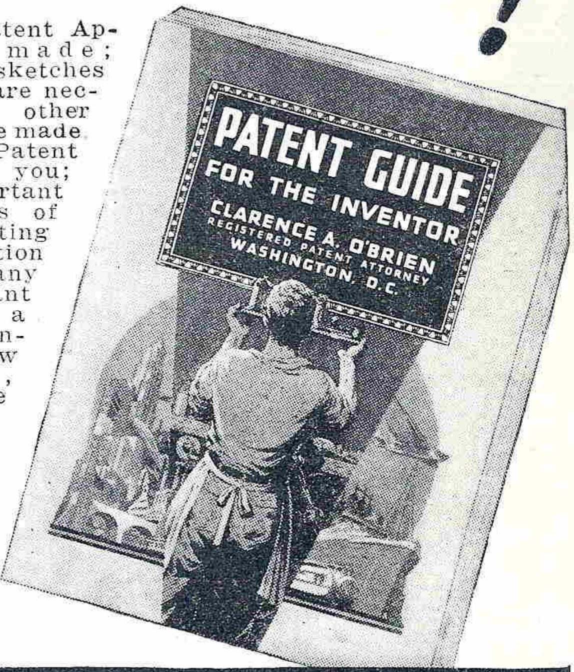

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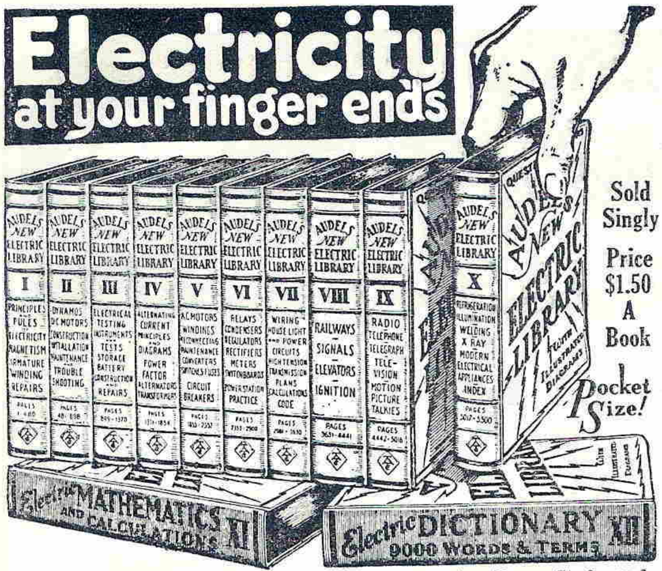
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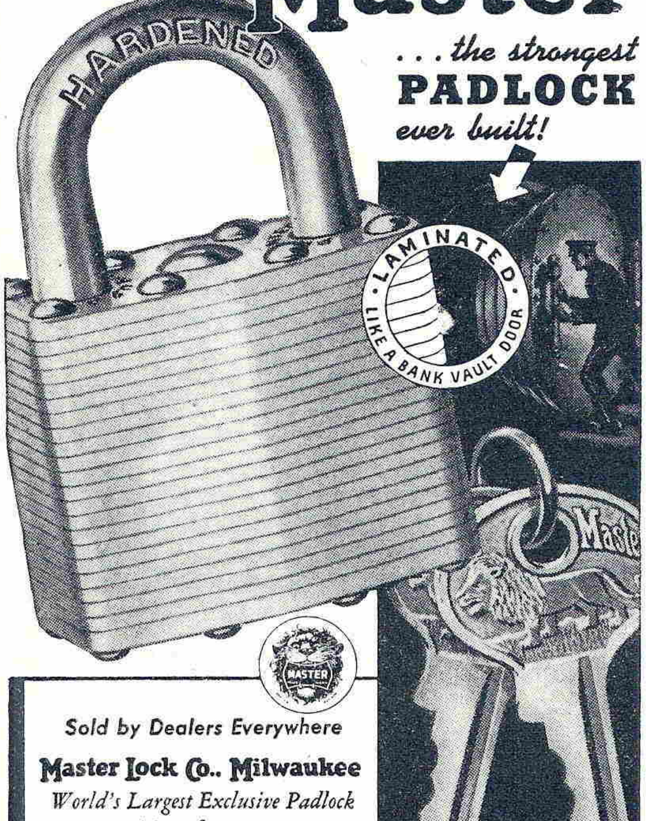

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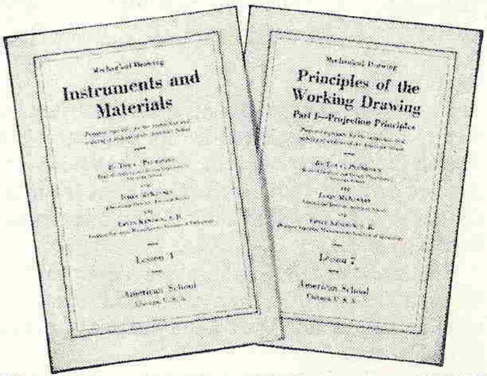
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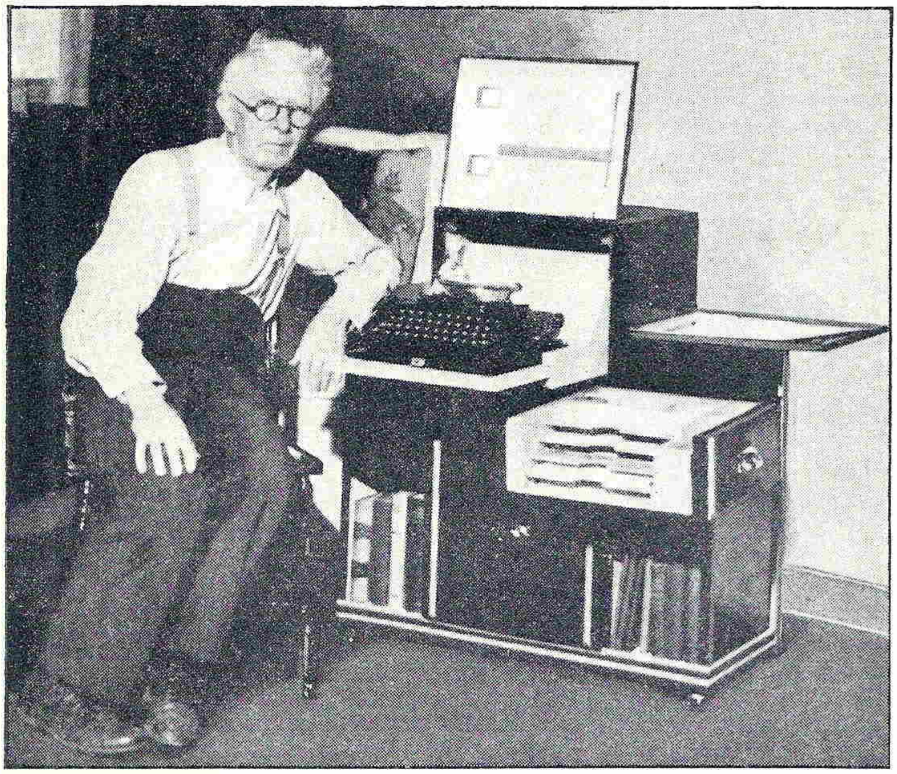


Using MM plans, 75-year-old W. L. Farmer, of Waukegan, Ill., constructed this novel and attractive typewriter desk. It provides ample room for a typewriter, letterheads, and books.

READERS who own typewriters and desire to possess a compact cabinet-desk that is not only attractive, but which features space for paper, books, and other items on a scale not found in ordinary desks, will do well to follow the example of W. L. Farmer, of Waukegan, Ill., and build one. His letter, which was awarded the first prize of $5 in this month's Workbench, states:

> Dear Editor:
>
> I am enclosing photos of the typewriter desk I built from plans that appeared in the February issue of MM. The desk not only excites the admiration and envy of all my friends, but it is the most comfortable and convenient typewriter desk I have ever used, which is saying a lot.
>
> The excellence of MM plans deserves loud acclaim when a 75-year-old man with bad eyesight and possessing only a few aged hand tools can produce a desk like this one.
>
> My desk features a small secret compartment, access to which can only be gained by the initiated.
>
> W. L. Farmer.

Our sincere congratulations are extended to Mr. Farmer. His craftsmanship surpasses that of many younger men.

***

Midget racers still roll from home workshops in increasing numbers. A letter from Tom Nicolosi, of Kansas City, Mo., describing his racer was awarded the second prize of $3. He writes:

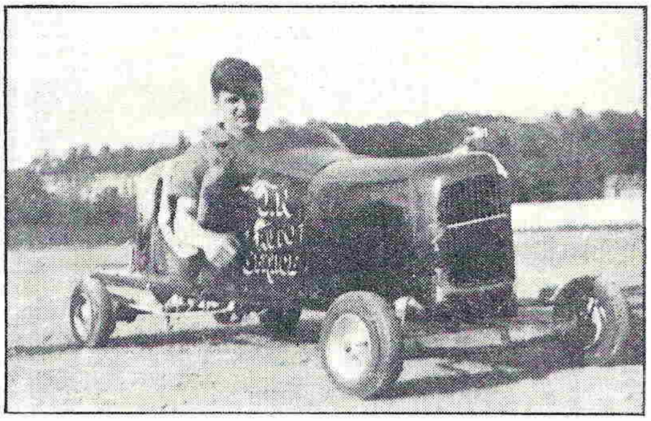
> Dear Editor:
>
> I am sending a photo of my midget racer. Built by my brother and myself, the tiny car is powered with a $\frac{3}{4}$ horsepower engine and travels about 25 m.p.h. The gas tank holds a quart of gas which takes the car about twenty miles.
>
> I enjoy your articles on midget racers and hope you will run more of them.
>
> Tom Nicolosi.

Tom and hundreds of other MM midget racer fans will undoubtedly enjoy the article on the Arlen Special front-drive racer continued on page 82 of this issue. We will anxiously await photos of the first Arlen Special to be completed by an MM reader.

***

The boating season being full upon us, it was only natural that we received more photos of completed boat projects than of any other type of project. One of the best project letters was received from Arnold L. Topham, of Bangor, Me., winner of a third prize of $3, who wrote:

> Dear Editor:
>
> Here is a photo of my "Moth" class boat which I built from MM blueprints. I had never built a boat before, but this little craft was easy to construct.



Traveling 20 miles on a quart of gasoline at a speed of 25 m. p. h., this midget racer is powered by a $\frac{3}{4}$-horsepower engine. Tom Nicolosi, of Kansas City, Mo., is the proud owner.

the Editor's Workbench

And—is she fast? I think I have the classiest and fastest boat on the river.

I think MM is a fine magazine and I have studied your "How To Build 20 Boats" books from cover to cover. They certainly are complete and I'm anxious for another issue to appear.

Arnold L. Topham.

We don't blame Topham for being so proud of his *Moth*. She certainly appears to be a trim and well constructed job.

***

When a boat fan builds one boat it's news, but when he builds two of them it's more news. Eugene Trivaudey, of Litchfield, Conn., is the reader whose double boat project was awarded fourth prize of $3. His interesting letter reads:

Dear Editor:

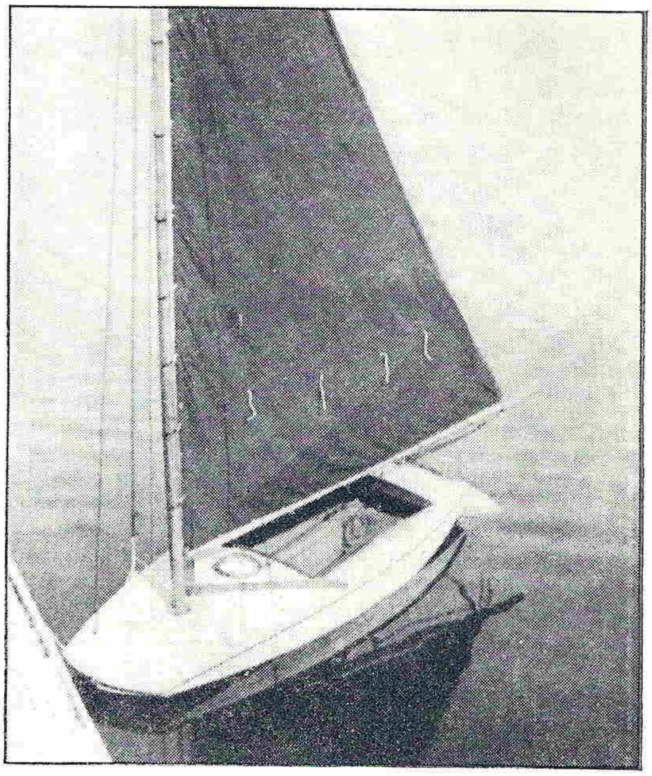
Last fall a friend of mine loaned me two issues of MM from which I built the sailboat "Nomad." Since then I have become very much interested in boat building. During the Spring I built "Sun Ray" from your boat book plans and gave it to my nephew.

We both belong to the same boat club and the two boats have been consistent trophy winners. I am looking forward to a new boat book so please hurry it along.

I have found your magazine very interesting, particularly the home workshop section. Please keep up the good work.

Eugene Trivaudey.

It pleases us to learn that the two MM boats are consistent trophy winners. It is conclusive evidence of Trivaudey's craftsmanship and speaks well for MM boat book plans.



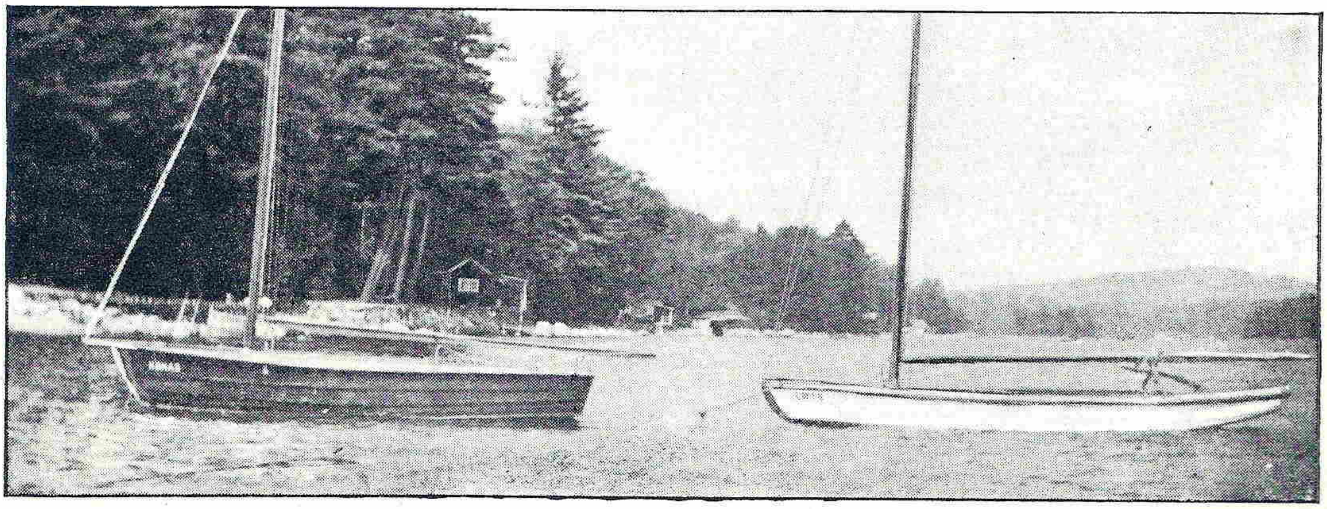
The cockpit of this trim *Moth* sailboat looks very inviting as it noses against a pier. It was built from MM plans by Arnold L. Topham, of Bangor, Me., who claims it is very fast.

Stuart Joyce, of North Hollywood, Calif., was awarded a $3 prize for his project letter, which states:

Dear Editor:

I have just completed a "Handy Henry" Ford tractor built from MM plans. The machine has proved

[*Continued on page* 16]



Eugene Trivaudey, of Litchfield, Conn., liked MM boat plans so much that he built a *Nomad* sailboat (left) for himself and a *Sunray* for his nephew. Both boats proved the excellence of their design and construction by winning trophies.

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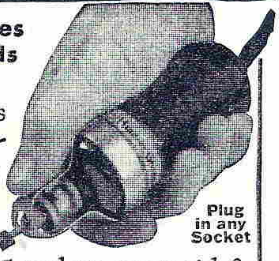

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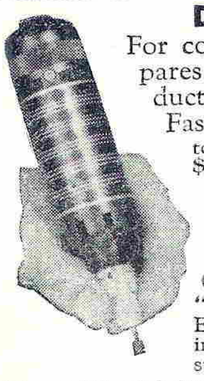

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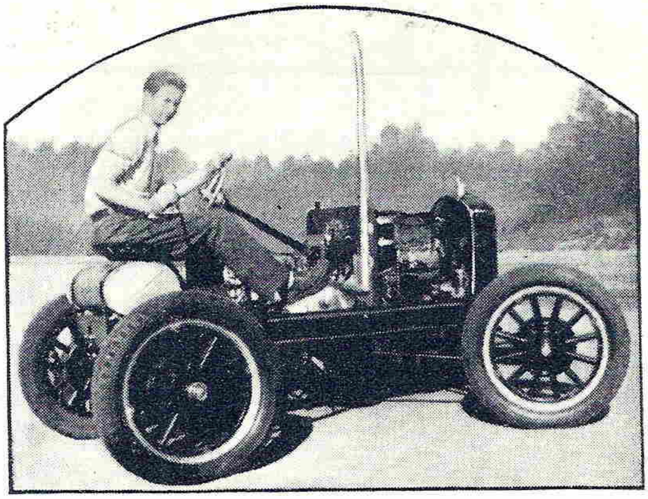
Editor's Workbench Chips

[*Continued from page 15*]



Powerful enough to do the work of three horses, this "Handy Henry" tractor was constructed by Stuart Joyce. Metal cleats replace the tires when the tractor is used on adobe soil.

to be very satisfactory, doing the work of three or four horses with ease.

The wheelbase is 70 inches to permit short turning. Metal rims and cleats replace the rubber tires when I use the machine on adobe soil, the tires being used only when plowing sandy soil. Sandbags are used for weight to insure traction.

I did all the work in building the tractor with the exception of some welding, the total cost being only twenty-two dollars. A few jobs and it will pay for itself.

Stuart Joyce.

It is doubly satisfying to construct a tractor, both for the pleasure and pride of craftsmanship involved and the fact that through its use one can often earn a few dollars. Good work, Joyce.

***

The Bellanca "gas" model project that starts on page 76 of this issue should have great appeal for the army of model aircraft fans who read MM. By starting construction at once, interested readers will be able to complete the model in time to enter it in some of the contests that are scheduled to be run at various airports throughout the country.

The flying of "gas" models has increased tremendously during the past year and undoubtedly will continue to do so. Next to piloting a real airplane, there are few hobbies that afford the thrills encountered while launching one of the "put-putters." With miniature gasoline motors increasing in efficiency while decreasing in cost, it will only be a matter of time when the flying of "gas" models will supersede the building and flying of large rubber-band powered models.

***

Talking of "gas" models, a letter was received

[*Continued on page 18*]

2 Beginning Lessons in Diesel Engineering Free

To Men Over 18 and Under 40

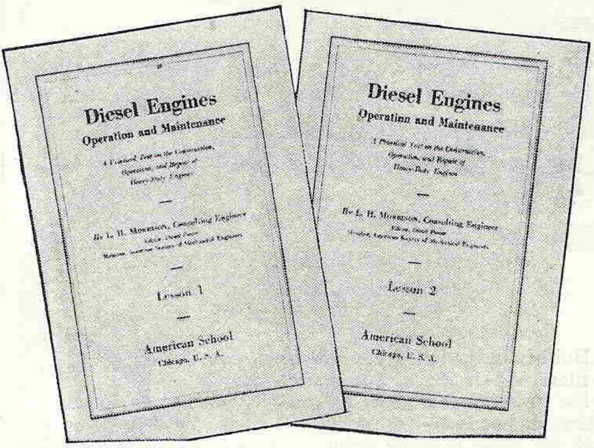
This offer is NOT open to boys under 18 or men over 40. But if you are WITHIN these age limits, you owe it to yourself to investigate this unusual opportunity.

Test Yourself Without Cost

See how readily you, too, can

Learn Diesel

At your leisure in your own home, read these 2 Diesel lessons carefully. Judge for yourself our ability to teach — and your ability to learn — this fast-growing new line of work. No experience needed.



Diesel — the New, Fast-Growing Power

Is Your Job Safe?

Just as the gasoline engine changed or wiped out the jobs of thousands who depended on horse-drawn vehicles for their living—just as electricity changed the entire set-up in the fields of light and power—so now the Diesel engine is fast invading both the power and transportation fields, and threatening the present jobs of thousands of workers.

If jobs in your line are steadily growing scarcer, you owe it to yourself to investigate this new, progressive, uncrowded line, that in our opinion will offer good openings for the next 25 years.

Diesel engines — because of their high efficiency, dependability, and economy of operation—are fast replacing steam and gasoline engines in power plants, motor trucks and busses, locomotives and ships, aircraft, dredges, drills, pumps, etc.—opening up an increasing number of well-paid jobs for Diesel-trained men. The field of Diesel Engineering is on the upgrade and continually expanding. It will provide steady employment, advancement and good pay for those properly trained in this new industry.

What This New Field Offers You

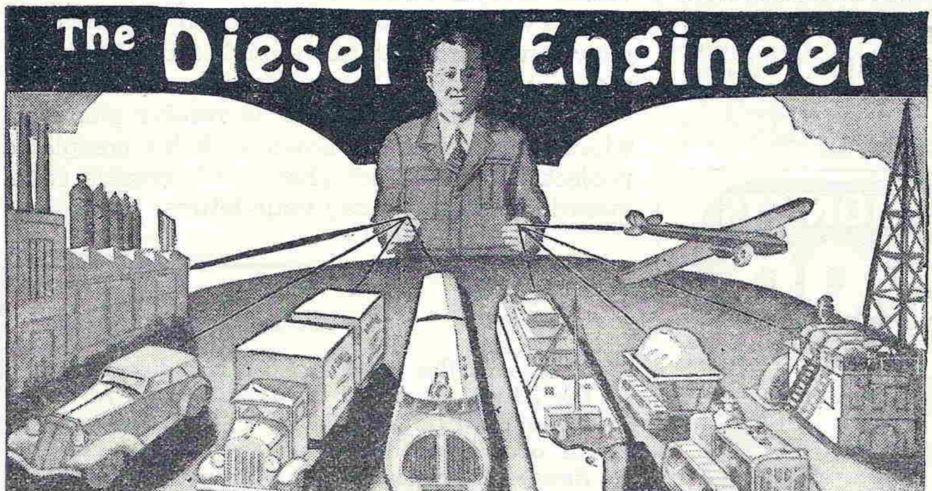
Now is your chance to get into a big new industry and grow up with it to an important position. Today there is practically no competition in the Diesel field, but the increasing use of Diesel engines will result in keen competition for jobs in the near future. By starting your training now, you can keep ahead of such competition.

You get complete information on all the latest Diesel developments—two- and four-stroke cycles; low- and high-speed and heavy duty types; Diesel-electric generating systems, etc.—in our course. Includes all text material—with special diagrams for quick understanding of this new power.

Real Opportunities for Trained Men

Get our Free Diesel Booklet and learn all about this new, fast-growing line—its opportunities and requirements. Find out what the Diesel field offers you—how rapidly the Diesel industry has developed during the last three years—the large number of Diesel engines and accessories being manufactured today—how quickly you can obtain a complete understanding of Diesel engine principles and operation by home study during your spare time! . . . at your own pace—without interfering with your regular work.

American School, Dept. DB28, Drexel Avenue at 58th Street, Chicago



Get These 2 Diesel Lessons

When you learn what worthwhile opportunities Diesel offers and how readily you can cash in on them through American School training, it may mark the turning point in your life. If you are over 18 and under 40, write TODAY for FREE lessons and FULL information. No obligation.

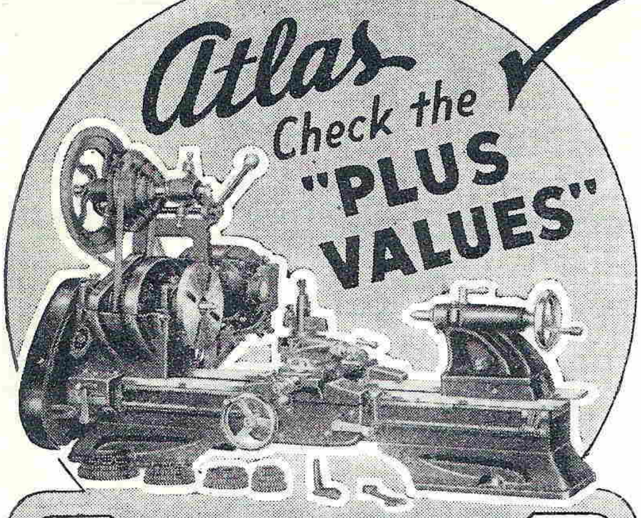
Free Lesson Coupon

American School, Dept. DB28,
Drexel Ave. at 58th St., Chicago

I am over 18 and under 40 years of age. Without obligation, please send me 2 Diesel lessons and Diesel booklet FREE.

*Name*____________________________

*Address*____________________________



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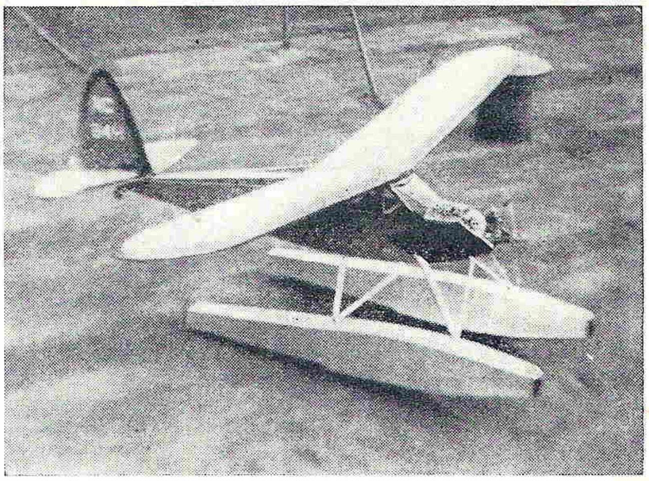
CARTOONISTS' EXCHANGE
Dept. 357-A Pleasant Hill, Ohio

Editor's Workbench Chips

[*Continued from page 16*]



Readily convertible into a land plane, this 7-foot "gas" powered seaplane model was built by Paul Broccard of N. Y. City. Aerodynamically stable, it has made more than 50 flights.

from Paul Broccard, of New York City, which was awarded a prize of $3. He writes:

> Dear Editor:
>
> I am enclosing a photo of my latest seaplane model. It is powered by a G.H.Q. miniature gasoline engine and has a wing span of seven feet.
>
> The model weighs six pounds including pontoons and engine, and is readily convertible into a land plane. More than fifty flights have been made by the model without a single crackup.
>
> Paul Broccard.

It would be trite to say that Broccard's model plane is well built, for the fact that it made fifty flights without cracking up indicates that it is aerodynamically perfect. As the pilots say—"Helmets off to you," Broccard.

***

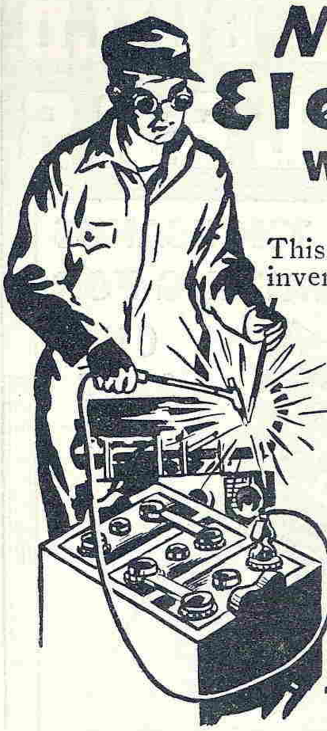
Readers are invited to send in photos and descriptive letters of their projects for the Workbench. Just send one or two clear photos of your project with a short note giving a few details and your contribution will be eligible for entry in the monthly contest.

When possible we prefer to receive photos in which the builder is shown with his completed project. However, all photos will receive equal attention, so send along your letters.

NOTICE

Due to the need for larger office space, the editorial staff of MM has moved to the Paramount Building in N. Y. City. However, all orders for blueprints and MM publications should be sent to our Greenwich, Conn., office.

New 6-Volt TRINDL Electric ARC WELDER



Works Off Any Storage Battery Or Ordinary Light Socket

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HOTTEST FLAME KNOWN

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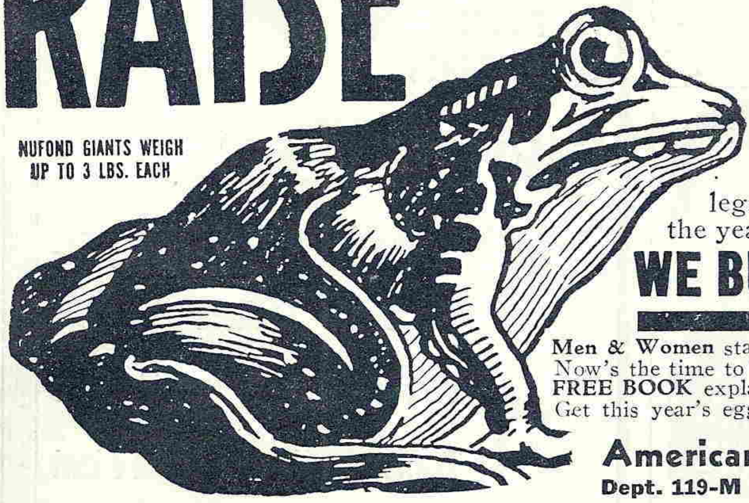

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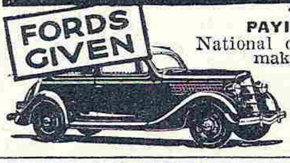

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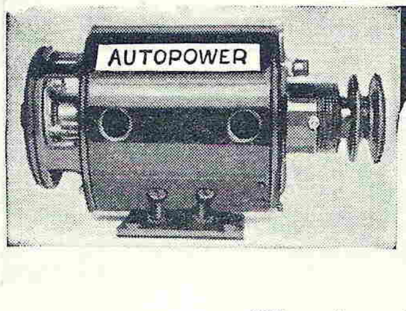

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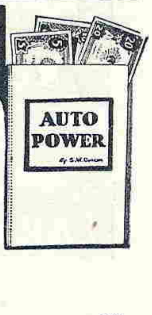

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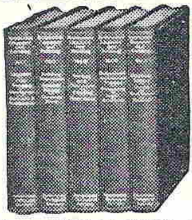

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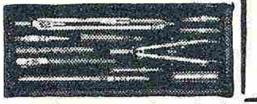

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I would like to look at the five books described above. Send them on your free offer. I will pay the few cents delivery charges only and will examine them thoroughly and return them in ten days unless I like them, in which case I will send you $2.00 and after that $3.00 per month until the total price of only $19.80 is paid. You are also to send me the drafting instruments and consulting membership certificate of the American Technical Society, without extra charge.

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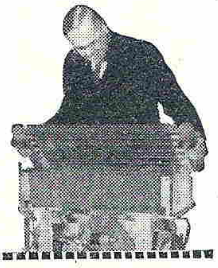

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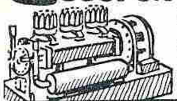

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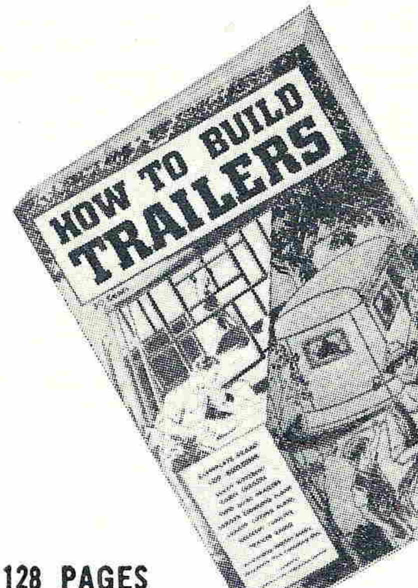

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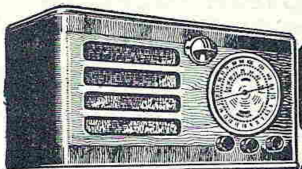

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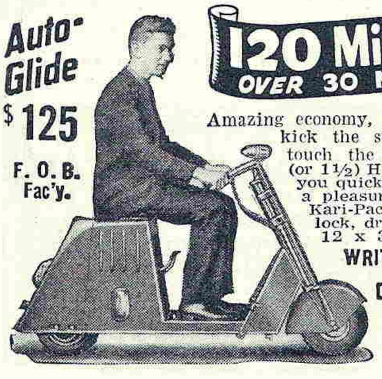

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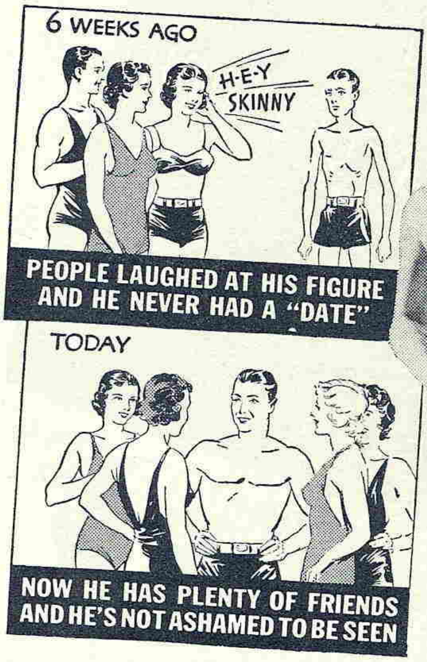
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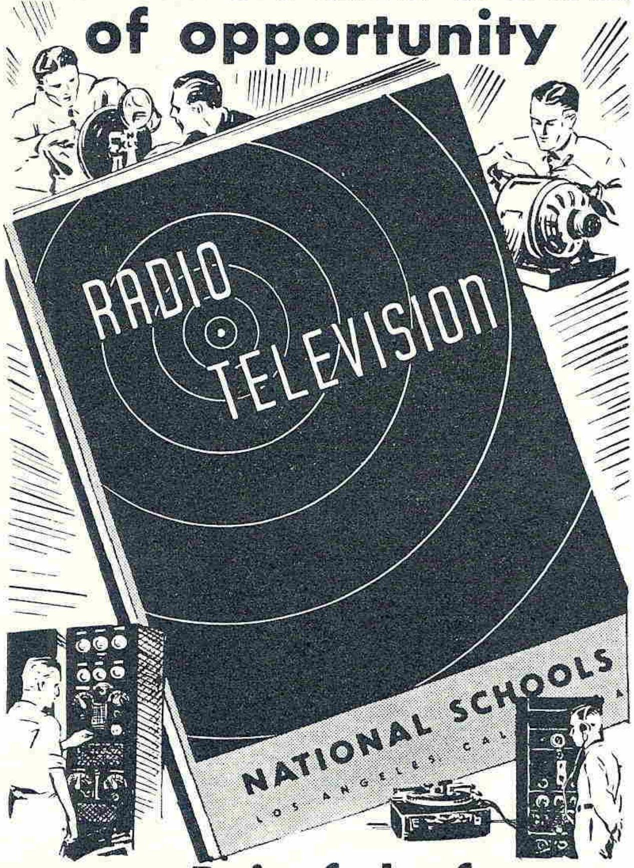

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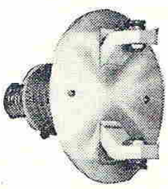

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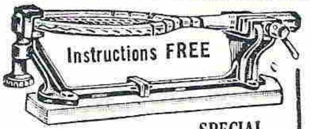

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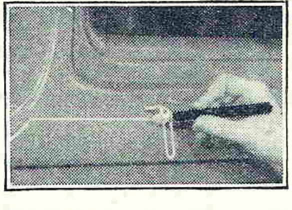

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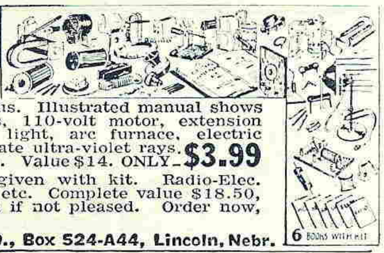

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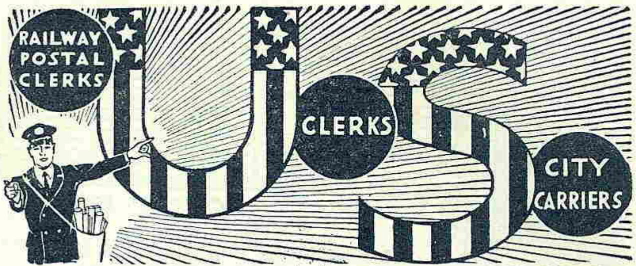

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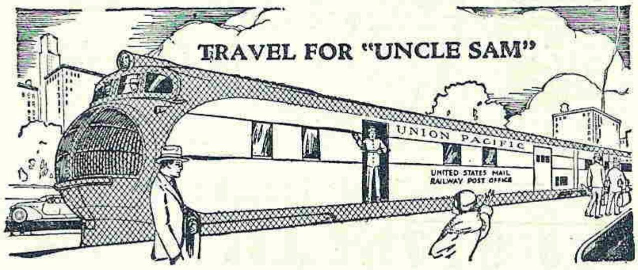
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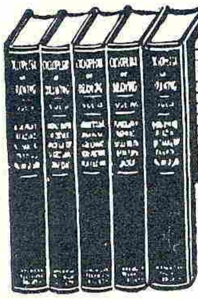

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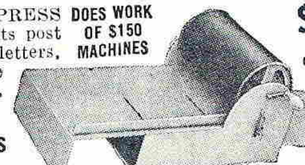

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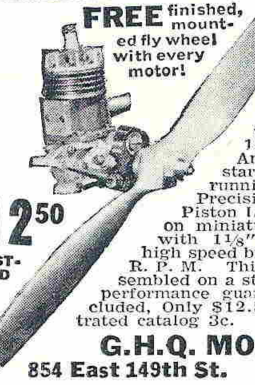

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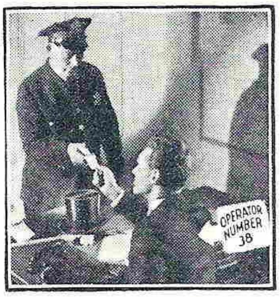

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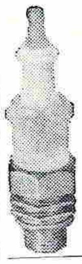

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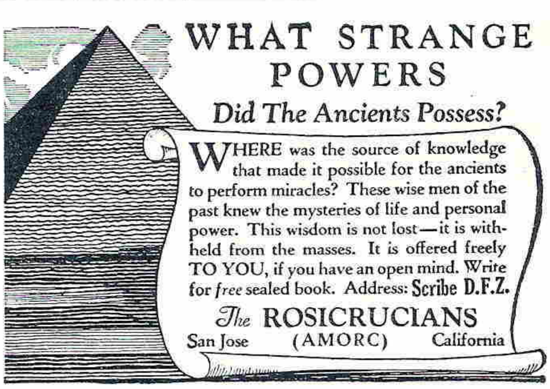

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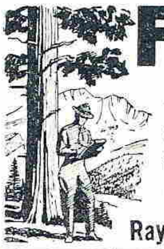

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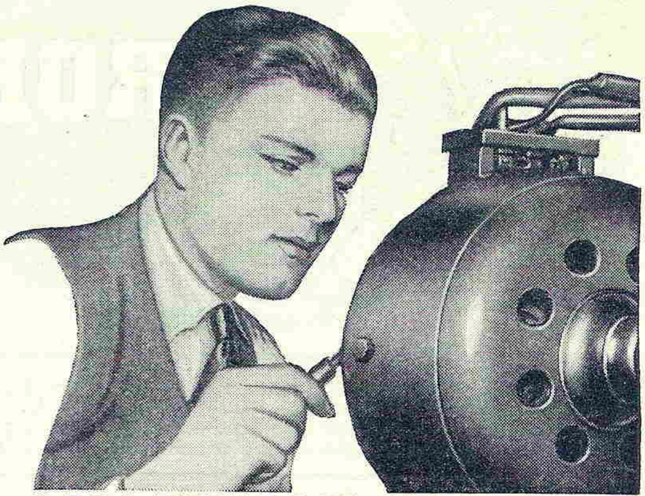

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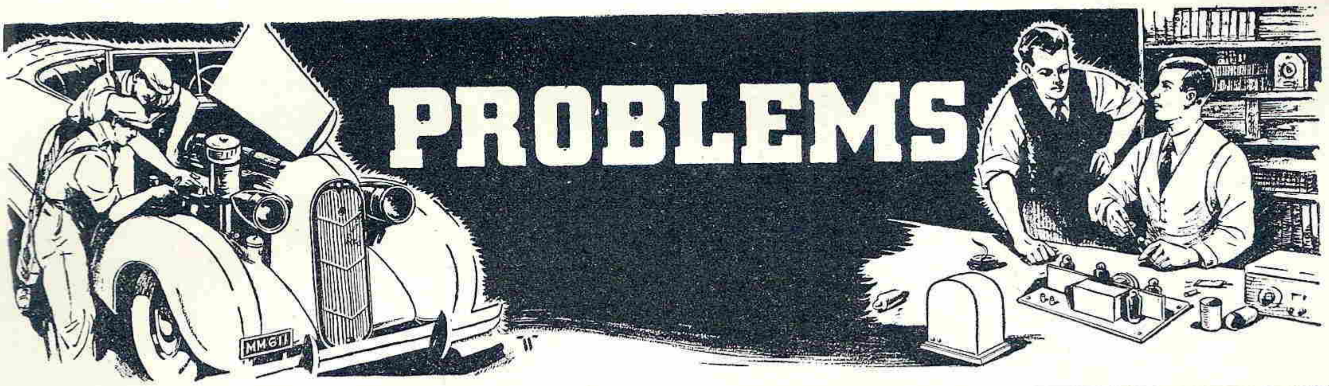


PROBLEMS

Editor's Note: Your questions will be answered personally and free of charge by MM experts provided they do not require special research or involve trade secrets. Names and addresses of manufacturers of new products described in this issue can also be obtained free upon request. Enclose a self-addressed and stamped envelope for reply. Address: Problems Editor, Modern Mechanix Publishing Co., 1501 Broadway, New York City.

OPERATING AN AUTO ON DIESEL FUEL

Having read much about the conversion of gasoline motors into diesel engines I am wondering whether you could enlighten me, somewhat, on the subject. I own an American-built car, of the six cylinder type, built in 1927. Is it possible to convert this motor into one that will burn diesel fuel and if so, where might I find plans for doing it? —Ivan A. Hughes, Tempe, Australia

Several years ago, T. S. Redmond, a Pacific Coast automotive engineer, developed a diesel fuel burning car from a standard four cylinder automobile intended for operation only on gasoline. The construction of this fuel oil attachment was described in detail in the 1936 edition of Modern Mechanix' "How To Build It" along with several other diesel conversion plans. The original Redmond car was designed for operating on both gasoline and crude oil; the motor first being heated by running it on gasoline and then switching over to crude oil. Later a car, operating only on diesel fuel, was designed which involved the use of a special cylinder head. Both of these fuel oil motors can be built by anyone possessing some knowledge of the operation of internal combustion engines. Those desiring copies of the "How To Build It" manual for 1936 can still obtain them from Modern Mechanix Book Dept., Greenwich, Conn., for 50c postpaid.

MAKING A GREASE REMOVING HAND SOAP

Like many other readers, I enjoy working with machinery, but as this is, by no means, a clean pastime, I find it extremely difficult to remove grease from my hands with ordinary soap. I am sure that you know of some formula for making a soap that will remove grease and grime in a hurry and hope that you will pass it along to the many mechanics who read MM.—L. Farkus, Charleroi, Pa.

A good quality hand soap that will effectively remove grease and dirt can be made from materials obtainable at your corner drug store. The following formula is suggested: Cocoanut oil, 50 parts; Caustic soda (40° Be'), 25 parts; Powered pumice stone, 50 parts; Lavender oil, ¼ part and Caraway oil, 1/10 part.

Heat the cocoanut oil until melted and add the caustic soda, stirring it into the oil where the temperature of the solution has reached 90° F. Last, add the powdered pumice stone and the perfumes and stir the mass thoroughly. To prevent evaporation, store the soap in metal containers fitted with friction lids.

B ELIMINATOR FOR MM AUTO RADIO

I constructed the six tube automobile receiver which appeared in the "Radio Builders Manual" and secured very satisfactory results, but as this set is several years old, it requires the use of B batteries for supplying plate voltages. Do you know where I might obtain plans for a B eliminator of the vibrating armature type which could be used in conjunction with my present receiver so as to bring it up to date?—George W. Eveleigh, Cos Cob, Conn.

Readers who constructed the six tube auto set which appeared in the "Radio Builders Manual" can easily build a B battery eliminator so as to dispense with the use of B batteries. A unit that will work well with this set was described in the May 1937 issue of Modern Mechanix in conjunction with the All-Wave Farm Receiver. The B power supply used with the farm set is interchangeable with the MM Auto Radio. By employing a B battery eliminator, only the car's storage battery is required for supplying current to the receiver.

GALVANIZING METAL BOAT FITTINGS

Having been unable to secure any practical information on the galvanizing of metal surfaces, I am wondering whether you could supply any helpful suggestions? I am building one of the MM boats, as described in your blueprint catalog and wish to chemically treat the metal fittings so as to reduce corrosion as much as possible. Is there any method whereby metal can be treated in this manner without the use of elaborate equipment? — George E. Smart, Toronto, Ont., Canada.

Iron can be chemically treated so as to provide an effective galvanized surface that will reduce, considerably, corrosion produced by salt water. Application of the chemical solution requires only the use of a cheap paint brush; the solution being applied to the metal surface in liberal quantities and allowed to react for 24 hours.

To make the galvanizing solution, mix 1 ounce nitrate of copper; 1 ounce sal ammoniac, dissolved in 2 quarts of soft water and 1 ounce of commercial hydrochloric acid in an earthenware vessel. Do not mix these chemicals in a metal container as the reaction of the chemicals on the metal will render the solution useless.

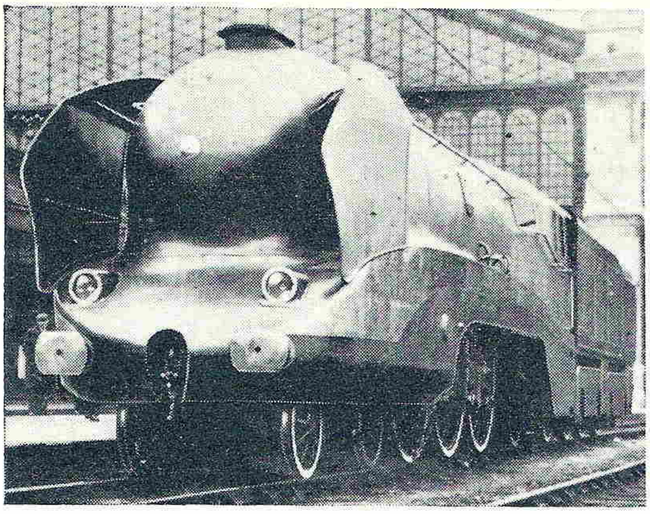
After the chemical has been allowed sufficient time to react on the boat fittings, a coat of marine paint or varnish applied over the galvanized metal will further aid in preventing corrosion.

MOULDING NOVELTIES WITH PAPIER MACHE

I am desirous of obtaining some information relative to the making of papier mache novelties. Can you furnish me with information regarding the making of the papier mache,

[*Continued on page* 28]

Locomotive Has Metal "Ears"



SPEEDS in excess of 120 m.p.h. are claimed for a new type streamlined locomotive constructed by a leading French railroad. In addition to the usual streamlining, the huge locomotive features two protruding "ears" at its front end which tend to create the visual impression of some prehistoric monster as it hurtles over the rails. The "ears" are made of metal and can be manipulated from the control cab, their purpose being to deflect the air at different angles along the locomotive's body as a pick-up in speed is achieved.

Metal "Bug" Bores Mines

A NEW mining machine, which theoretically could bore a hole to the center of the earth, has been developed. The device operates in the manner of a burrowing insect and in California tests bored to a depth of 1,125 feet through dirt and hard rock formations.

The "bug" is made of metal and has 15-foot jaws. The body of the device houses an electric motor, while screw jack legs are used to hold it in position against the sides of the hole being drilled.

The jaws of the machine consist of an empty barrel-shaped device, the edges of which are fitted with teeth that cut in a circular track as the jaw is revolved by a drive from an engine. The empty barrel receives the loosened rock and dirt debris and upon becoming filled is detached and hoisted out of the hole by means of a cable arrangement. The machine drills a hole large enough to accommodate a crew of men in an elevator.

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1887-1937
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YOUR answer might be "The invention of the automobile," or any one of hundreds of other events.

Put reasons in not over 100 words. Send entry with one STERNO label or facsimile, and dealer's name and address. DEALERS: There's at least $5 for you (or your clerks) if your customer wins on entry blank you signed. Display Sterno during the contest. Explain conditions relating to it. Enter the contest and win a prize yourself.

FOLLOW THESE RULES
1. Anyone except STERNO employees may enter.
2. Write on STERNO GOLDEN JUBILEE PRIZE CONTEST blank (ask your dealer for one) or on a plain sheet of paper: (a) What you consider to be the event that has done most to contribute to the prosperity of America during the past fifty years (the period during which the Sterno Corporation has been in business) and (b) give reasons for your choice in not more than 100 words. Literary style isn't important — awards will be based on the merit of your reasons.
3. All entries must be accompanied by label or facsimile.
4. In case of tie, duplicate prizes will be awarded. Judges' decisions are to be final.
5. All entries must be postmarked not later than September 30, 1937.

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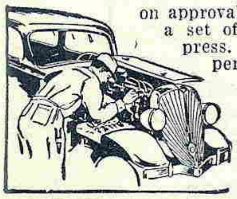

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Problems

[*Continued from page 26*]

itself. Can this compound be made in the home workshop and if so, how?—H. F. Schollion, Panama City, Florida.

Papier mache can be formulated in the home workshop from common household ingredients. A moulding material that should well meet your requirements is made as follows: Secure several sheets of old newspaper, cut it into small pieces and boil in water until it becomes a tacky mass, then squeeze out the water. Next, place the pulp in a bowl and add 4 tablespoonfuls of hot glue, mixing it well into the paper in gradual quantities and at the same time adding plaster of Paris until 8 ounces have been mixed into the mass.

As the compound has a tendency to dry out quickly it will be necessary to mould the novelties at once. The papier mache, though, can be kept in a workable condition by wrapping it in a damp cloth and storing in an airtight metal container.

INSTALLING BRAKES ON AUTO TRAILER

I have, just recently, completed the building of "Aloha", the 14½-foot house trailer which was described in a past issue of Modern Mechanix. Since the original plans listed brakes as optional equipment and gave no details regarding their installation, I would like to know where I might secure some information regarding trailer brakes and instructions for installing them. Has any trailer brake data been compiled by Modern Mechanix? If so, will you tell me in what issue or issues it appeared?—David Lurring, Akron, Ohio.

Aloha, as well as all other Modern Mechanix trailers, can be equipped with brakes. Either mechanical or vacuum brakes can be installed in Aloha; both will perform well if care is exercised during the installation. Many trailer builders are under the impression that only the front axle assembly, salvaged from a wrecked car, can be used for the running gear of a trailer, but this is, by no means, correct. The rear-end assembly, obtainable from any car wrecking yard, will provide the trailer builder with the necessary materials for building a sturdy running gear that is already provided with the necessary braking mechanisms. By connecting a cable control between the car brakes and those of the trailer an effective braking system, which will stand up under the most severe conditions, will result. Complete instructions for trailer brake installations of both the vacuum and mechanical types will be found in the new MM manual, "How To Build Trailers", which is available from Modern Mechanix Book Dept., Greenwich, Conn., at 50c.

HOW TO TINT WOOD VENEERS

In a past issue of Modern Mechanix there appeared an interesting article on wood inlays. As I am quite some distance from the city, I have not been able to secure colored inlay wood. Is it possible for me to stain or dye natural wood inlay material to the particular shades required. If so, what method should be employed in coloring the natural wood veneering?—Roland Gustwhite, Cape Charles, Va.

If you have been unsuccessful in securing colored veneering for inlay work, you can tint the natural wood to any desired color with ordinary liquid egg dyes. These dyes can be purchased in packages of six bottles, each containing a different color, from your local druggist or grocery store. The dyes can be applied to the wood with a cotton swab until the correct color shade is obtained. Since the dyes contain an alcoholic solvent, they will dry almost immediately after being applied.

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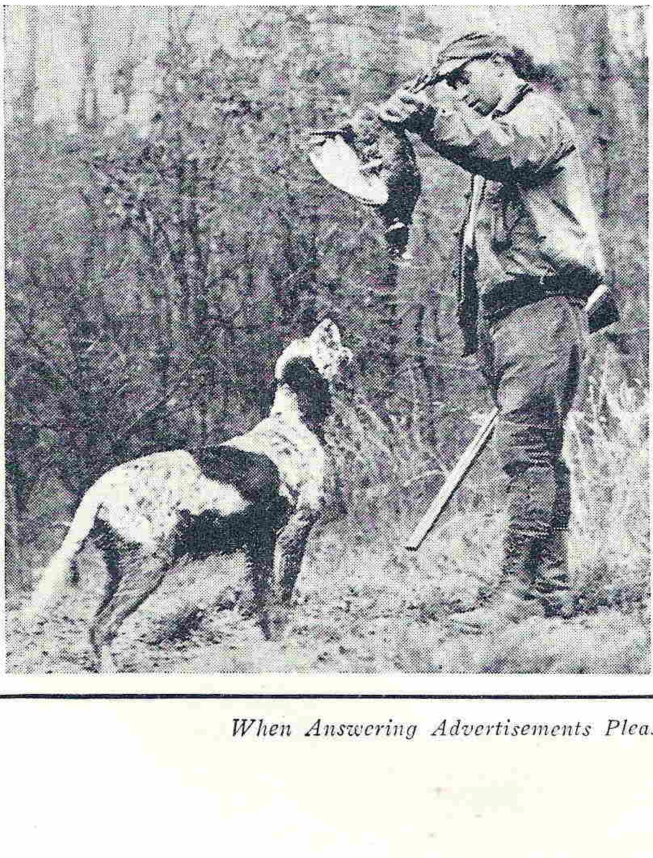

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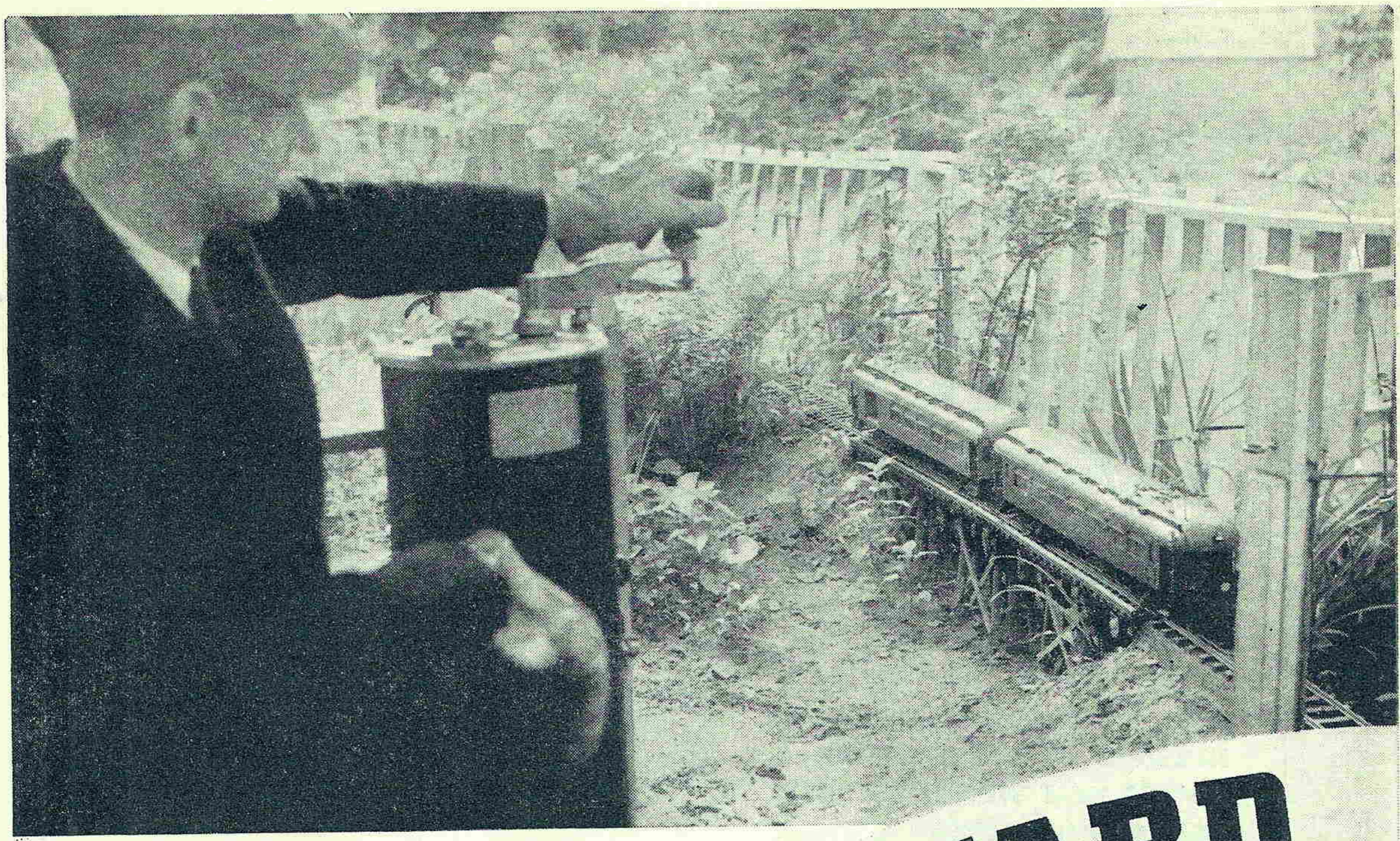
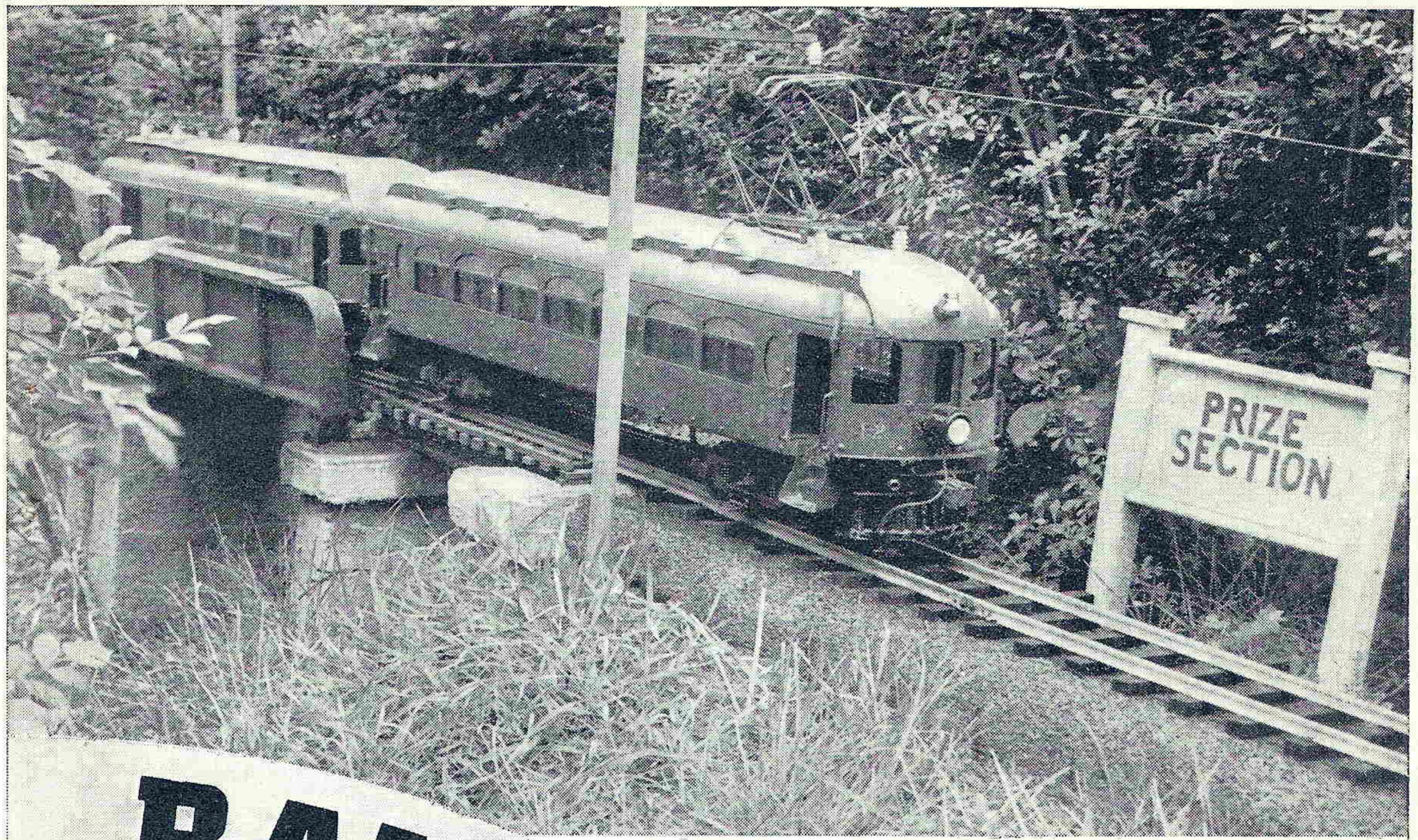


Acting as motorman for the miniature North Jersey Railroad located in the yard of his Yonkers, N. Y., home, E. J. Quinby presses the "dead man's button" of the controller, yanks the handle a notch or two and speeds the train on its way. The controller was salvaged from a real car. Right—The model terminal of the "system" provides utmost realism.

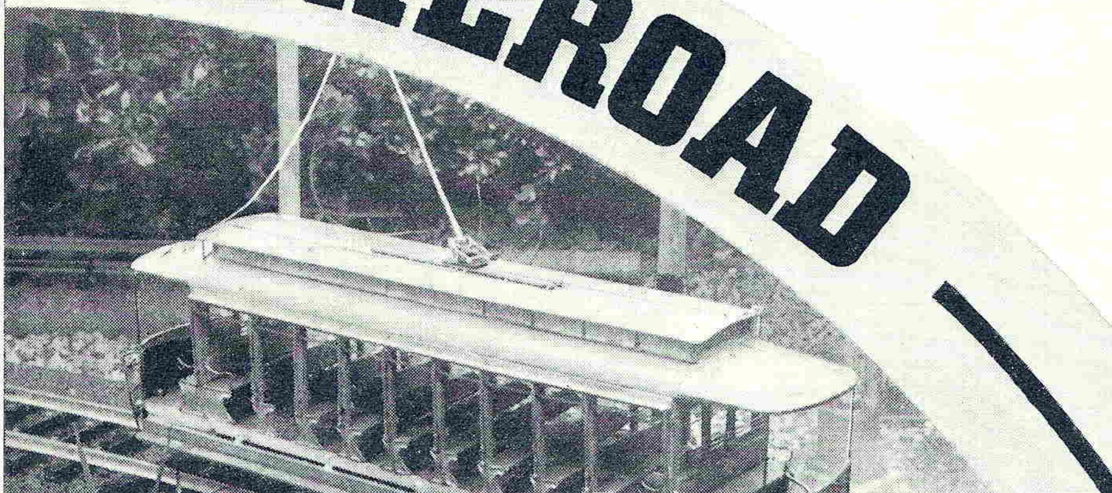
BACKYARD

THAT automatic block signaling system, devoid of switches, relays and elaborate circuits, looked mighty good on paper. In fact, it seemed too good to be true. Surely somebody must have thought of it before. It must have been tried. But where was the hitch?

Unable to demonstrate his signaling system on a regular railroad, E. J. Quinby, of Yonkers, N. Y., did the next best thing. He built a model electric road in his own back yard. For utmost realism, he actually copied an interurban electric line even to the last detail. The block signaling system was installed, demonstrated, patented. A leading company secured the patents and today the signaling system is acknowledged to be the simplest and most practical of any.

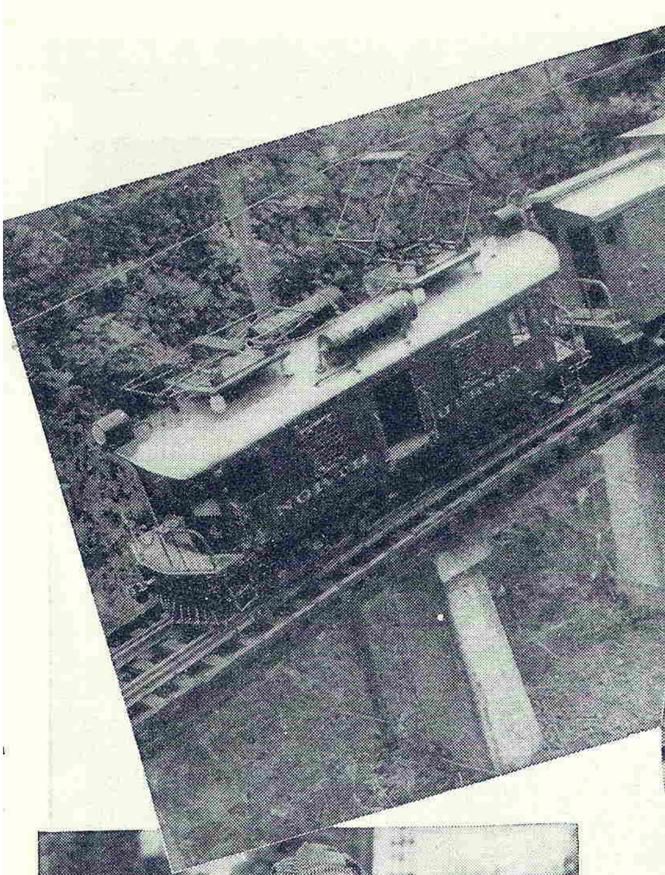


RAILROAD

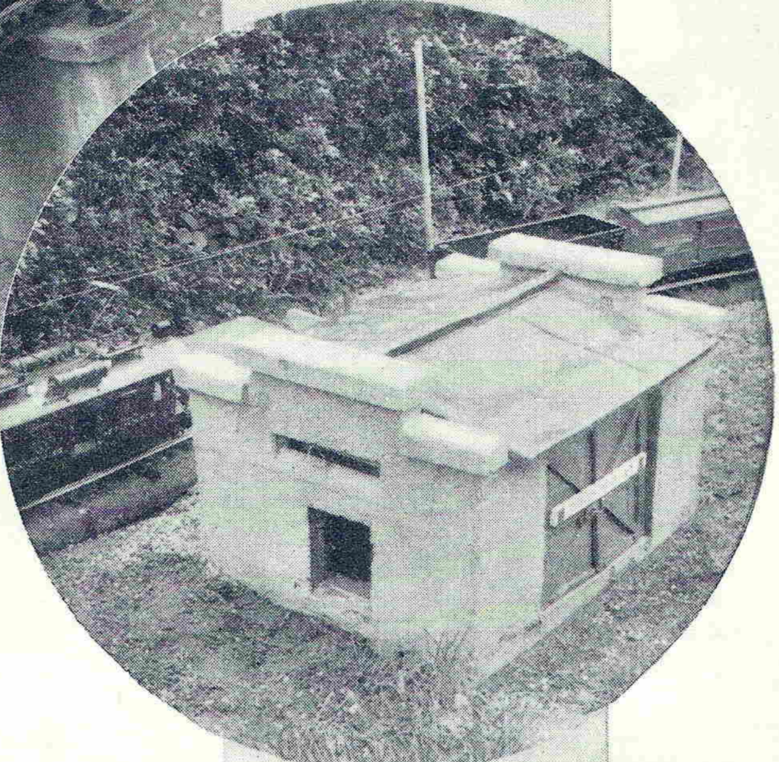


The "crack flier" of the line enters the prize section of the layout. Note the neatly strung overhead power wire, the carefully graded right-of-way, the trestle, and the natural topography. Left—A touch of the Gay Nineties is afforded by the line's open trolley car, which is operated by a worm gear motor-drive. Note the "cow catcher".

Meanwhile, this man boasts of one of the country's outstanding electric miniature railroads. Wearing his good old motorman's cap and gloves, with one hand resting firmly on the "dead man's button" of the controller handle and both eyes glued to the track ahead, Quinby dashes along with his electric trains over a most picturesque interurban route. Tunnels, bridges, trestles, cuts, fields, hills and dales—all offer the thrills of a high-speed trolley line. Little banjo-type block signals flash red or green as their blocks are occupied or cleared. Yet it's just make believe. For aside from the real full-sized controller at which he sits, this engineer is riding his miniature trains purely in spirit, since the little cars he controls over his back



The photo at left shows "old No. 4", the only locomotive on the line. With a polarized relay in its cab, this locomotive can be reversed from the remote, stationary controller. Note realistic trestle.

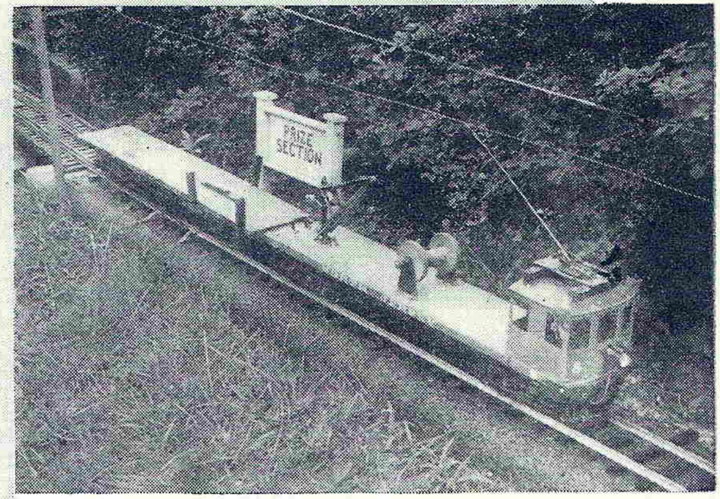


Operating the trains with the skill of an old-timer, Jackie Quinby (left) is the most envied boy in the neighborhood when he runs his father's miniature railroad. Circle—Tools, insulators, etc., are stored in concrete huts along the right-of-way.

yard railroad would hardly hold one shoe.

There's quite a story behind this outstanding miniature railroad. Years ago Quinby was assistant engineer of the North Jersey Railroad, a high-speed electric line between East Paterson, N. J., and Suffern, N. Y. In 1929 the ever-increasing motor bus competition caused the line to be dismantled. For purely sentimental reasons, however, its assistant engineer decided to perpetuate its memory in his own back yard, to the scale of one-half inch to the foot, or one twenty-fourth actual size.

[*Continued on page* 130]



Local boys vie for the honor of being appointed members of a maintenance crew so they can operate the miniature work train shown above. The coveted "Prize Section" award goes to the crew doing the best work each month.

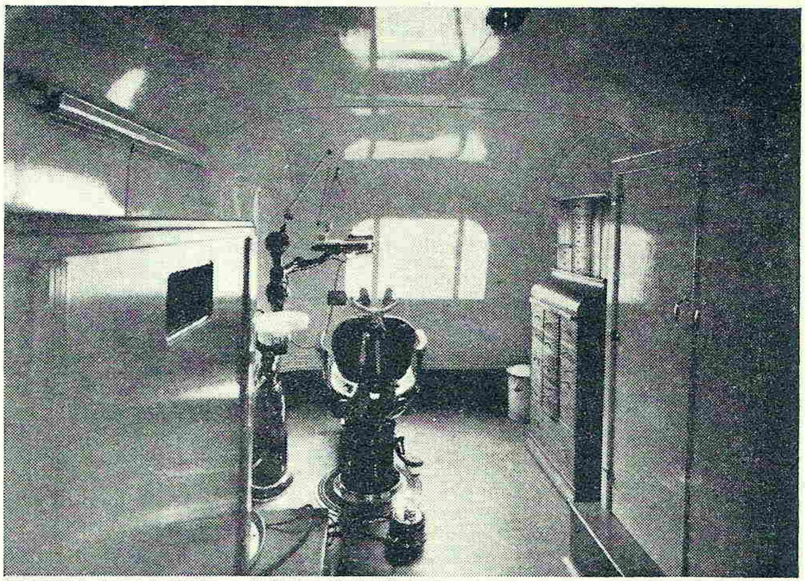
Dental Office On Wheels Visits Outlying Towns

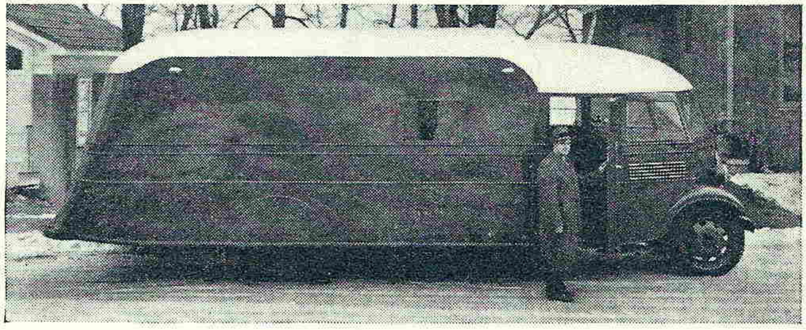
A COMPLETE dental office housed in a specially built bus is being used by Dr. Freeman L. Blunt of Albert Lea, Minn., to aid toothache sufferers living in outlying communities in the southern part of the state.

The twenty-five-foot office was built on a one-and-a-half-ton truck chassis and all the features of a permanent office, with hot and cold running water, were permanently installed.

Dr. Blunt, with an assistant, follows a regular schedule of twice-weekly visits to five villages of Freeborn County, none of which has a resident dentist.

The spacious interior was designed to please the eye of the patient. Paneled walls of masonite are oyster white in the laboratory and operating room, while the waiting room is done in a restful silver green satin finish. Linoleum used throughout is in Spanish red, with woodwork matching walls.





Dr. Blunt is shown with his unique dental office on wheels which is used to pay bi-weekly calls to outlying towns without resident dentists. Top photo shows interior of the office.

New Bottles Can Be Stacked

William Fehr is shown holding two of his "stackie" bottles. The hollow bottom makes it possible to stand one on top of the other. At the right is shown a large pile of the bottles.

A NEW bottle, called the "Stackie," has been invented by William Fehr of Sacramento, Calif., making it possible to stand one bottle on top of another.

Holding twelve ounces, the bottom is shaped so that the crown capped neck of another bottle will fit into the hollow and allow the bottom of one bottle to fit onto the shoulder of another. A ridge on the shoulder keeps them from slipping.

The design is said to open new merchandising possibilities, being adaptable to mass displays where bottles are stacked one on top of another to form various types of displays and designs. For shipping, approximately forty per cent less space is required.

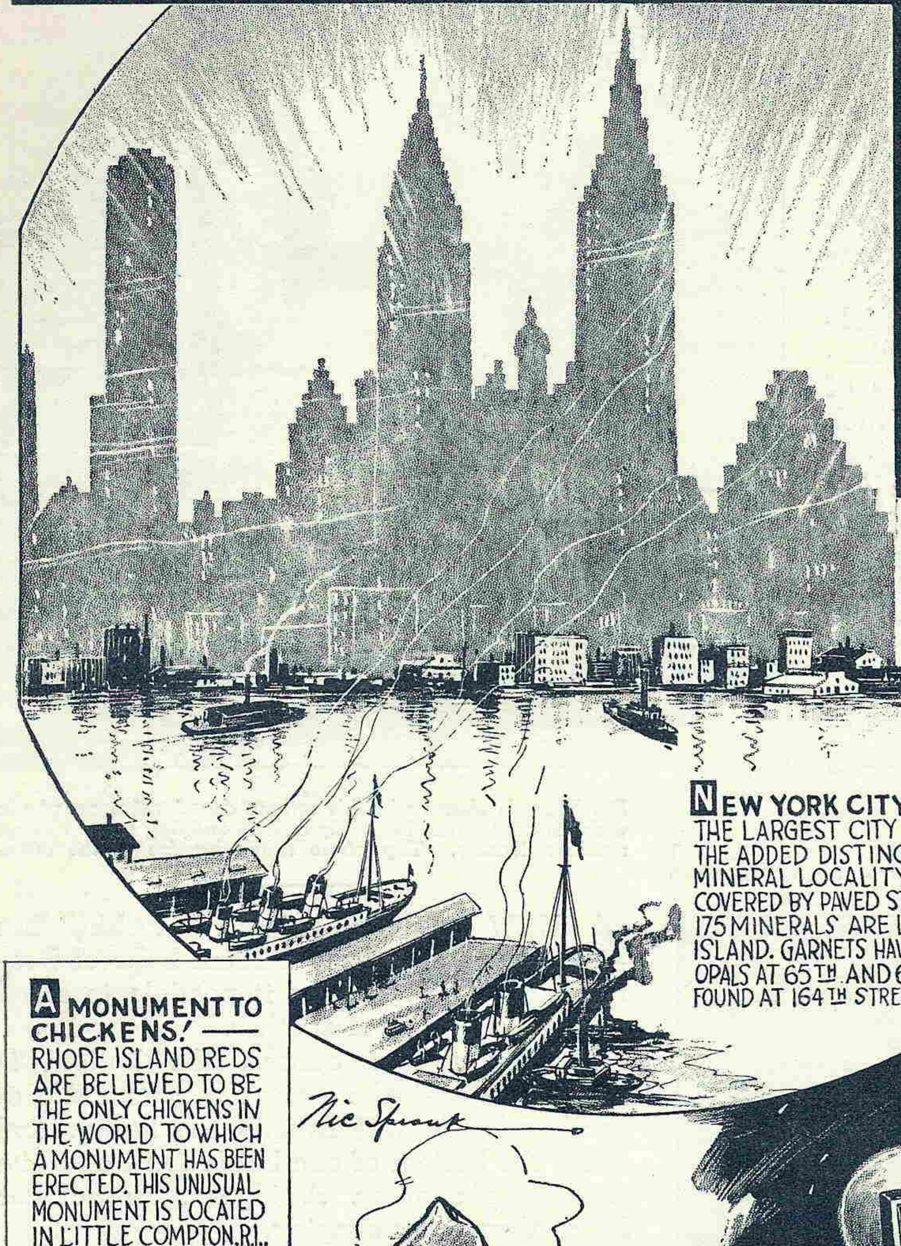
Smithsonian Gets 1902 Car

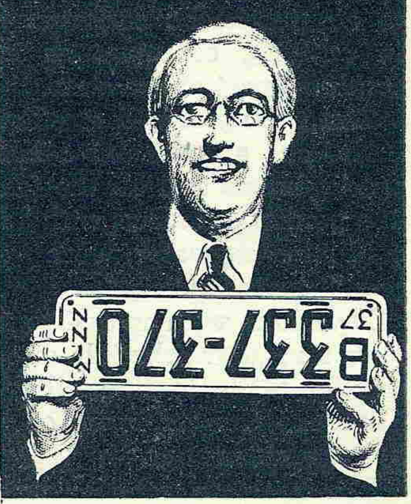
TO THE Smithsonian Institution's collection of historic automobiles has been added the first Franklin car that chugged away from the plant's gates in 1902.

This car, pioneer of a long line of air-cooled autos, was in service until 1916.

License Spells Car Owner's Name

Nic Sprank Offers $5.00 For Best Oddity

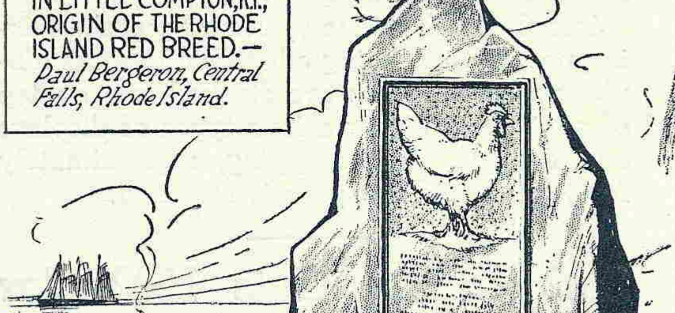


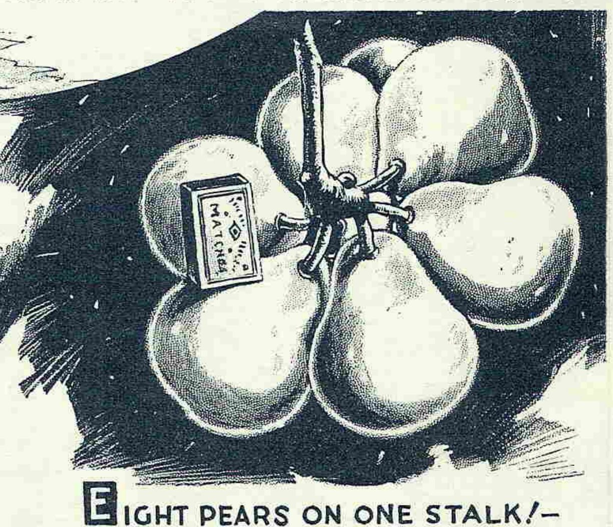


CAR LICENSE SPELLS NAME!-OLE LEE, OF BADGER, MINN., HAS THE UNIQUE DISTINCTION OF HAVING AN AUTOMOBILE LICENSE WHICH WHEN VIEWED UPSIDE DOWN, SPELL HIS NAME. —*Milton Waldron, Nopewing, Minn.*

NEW YORK CITY A MINERAL MINE!- BESIDE BEING THE LARGEST CITY IN THE UNITED STATES, NEW YORK HAS THE ADDED DISTINCTION OF BEING BUILT ON THE BEST MINERAL LOCALITY IN THE UNITED STATES. ALTHOUGH COVERED BY PAVED STREETS AND SKYSCRAPERS, AS MANY AS 175 MINERALS ARE LOCATED IN THE EARTH OF MANHATTAN ISLAND. GARNETS HAVE BEEN FOUND AT BROADWAY AND 65TH ST. OPALS AT 65TH. AND 66TH STREETS AND TOPAZES HAVE BEEN FOUND AT 164TH STREET AND ST. NICHOLAS AVE.-*Ed. Pitra, Berwin, Ill.*

A MONUMENT TO CHICKENS!— RHODE ISLAND REDS ARE BELIEVED TO BE THE ONLY CHICKENS IN THE WORLD TO WHICH A MONUMENT HAS BEEN ERECTED. THIS UNUSUAL MONUMENT IS LOCATED IN LITTLE COMPTON, R.I., ORIGIN OF THE RHODE ISLAND RED BREED.— *Paul Bergeron, Central Falls, Rhode Island.*

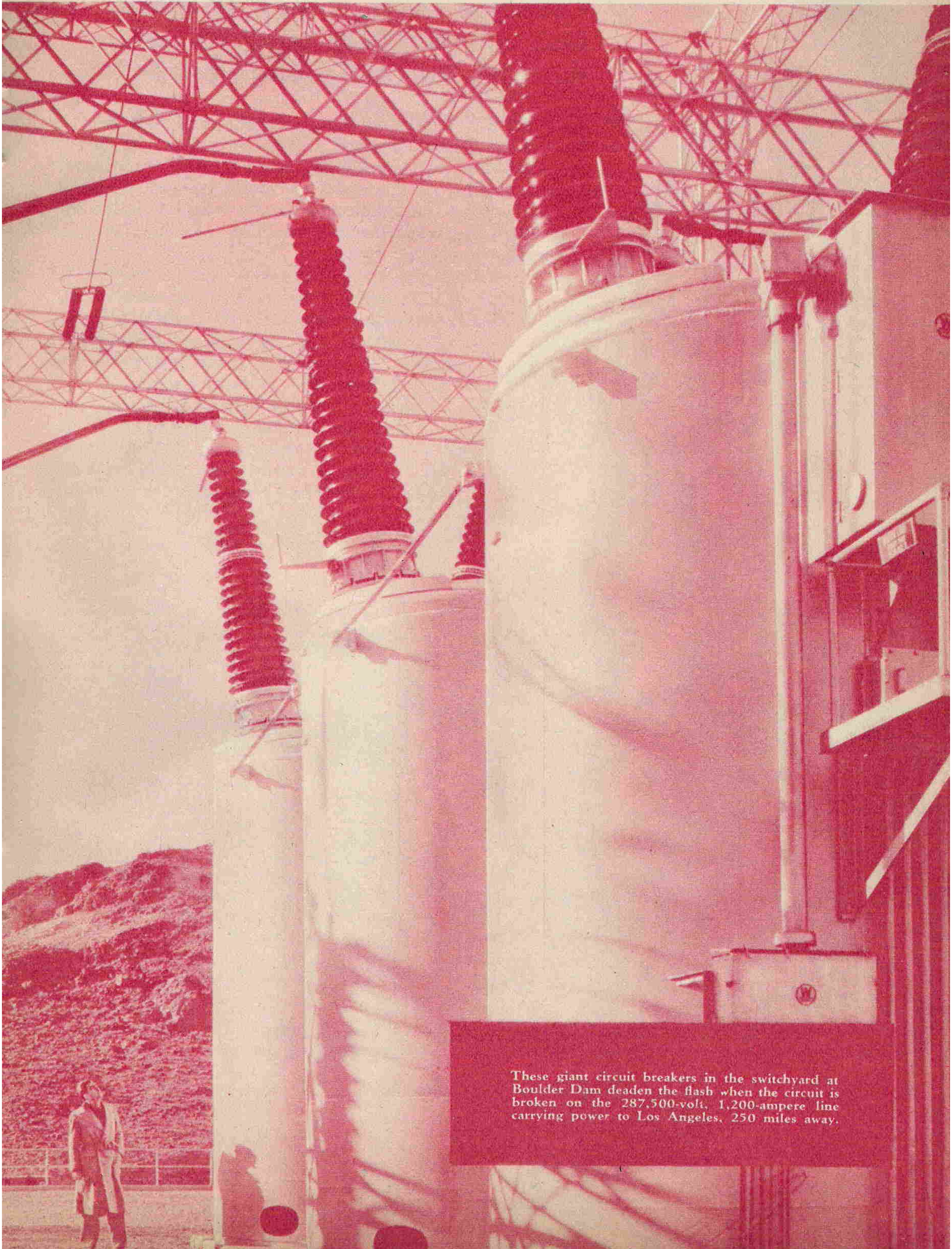




EIGHT PEARS ON ONE STALK!— WHAT IS BELIEVED TO BE A RECORD BUNCH OF PEARS ON ONE STALK WAS GROWN BY JOHN MALAN OF CAPE TOWN, SOUTH AFRICA. THE MATCH BOX SHOWN FOR COMPARISON, INDICATES THE SIZE OF THE FRUIT. —*A. Gordon Lee, Cape Town, South Africa.*

Five dollars will be paid for the oddity used by Nic Sprank as his central illustration. One dollar will be paid for all others used on this page. Send your oddity to Nic Sprank, Modern Mechanix Publishing Company, 1501 Broadway, New York, N. Y. Source or proof of each oddity must be given. Send all oddities separately, not with other manuscripts or letters.

World's Largest Switch



These giant circuit breakers in the switchyard at Boulder Dam deaden the flash when the circuit is broken on the 287,500-volt, 1,200-ampere line carrying power to Los Angeles, 250 miles away.

EXPOSING The

Collectors with money to spend find counterfeiters ready to meet demand for all "copies" needed.

by
James N.
Miller

SECRET SERVICE sleuths, working on a private tip-off, recently achieved a sensational "snatch" in New York City. In an out-of-the-way office, on a back street, they located headquarters of a gang dealing in counterfeit and stolen stamps. Elaborate manufacturing paraphernalia was seized, including engraving gadgets, perforation machines, coloring apparatus and various kinds of gum.

Federal officials, after a laboratory study of some of the newly made stamps, of the current two-cent variety, declared they were about the best ever faked. Had it not been for the vigilance of Uncle Sam's undercover men, the nation might now be flooded with the spurious stickers.

Almost simultaneously with this important discovery, police in Barcelona, Spain, arrested two gangs dealing extensively in bogus postage stamps. They had been imitating the widely

L. Stewart Barr trying out one of his newest inventions, a self-illuminating magnifying glass. This device is useful for detecting forged, repaired or otherwise "fixed up" stamps. It has its own battery and may be carried in the pocket.

Most of these stamps are fakes—Can you pick them out?

6
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POSTES
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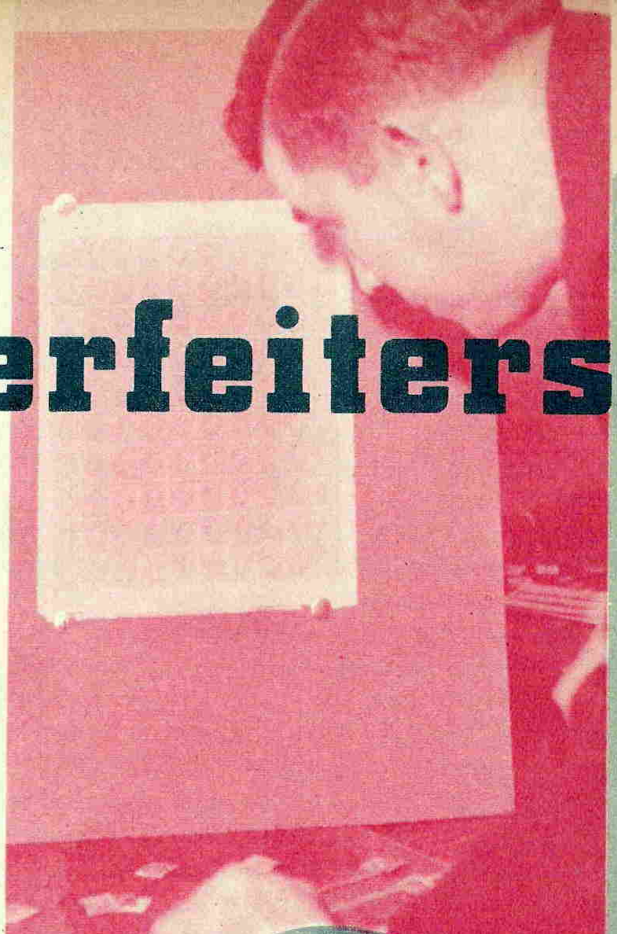
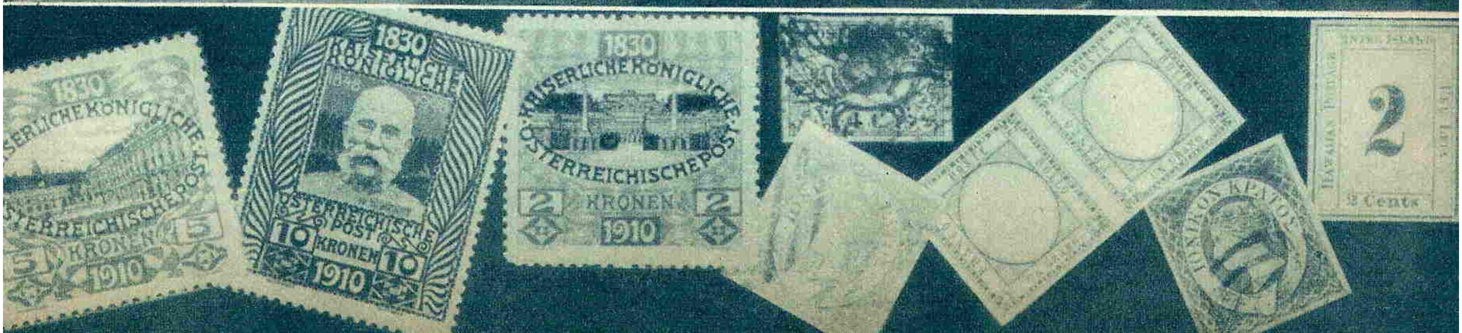
STAMP Counterfeiters

used Spanish 30-centime issue so adeptly that the government found it necessary to withdraw the real stamps from use and to manufacture, in their place, a new kind of engraved variety.

Just how widespread is the counterfeiting of stamps, not only of the "rare" issues but of the current varieties? And what protection, if any, has the average collector against illegal imitations? These questions may now be answered, for readers of MODERN MECHANIX by two outstanding world authorities: H. A. Robinette, Washington dealer, and L. Stewart Barr, collector and resident of the nation's capital. In days gone by, dealers did not want to own a single counterfeit. But Mr. Robinette has developed his collection of bogus varieties to one of the largest in the world, so he can have





Right—Mr. Barr examining damaged copies. A micrometer and compass are shown at his right. Upper right—Examining some fake Confederate stamps. At bottom of the page is seen a group of forged stamps. At extreme left, on the opposite page, is the only genuine stamp in the group.

a measuring stick for good and bad stamps offered for sale either to himself or his friends.

As for Mr. Barr, he has spent a considerable portion of his past twelve years of extensive travel in studying counterfeit stamps in every section of the world. Today he probably knows as much about bogus European varieties as any American.

First of all, Mr. Robinette points out a revolutionary development in philatelic circles:

Not long ago the Treasury Department decided that it is legal to illustrate the stamps of dead governments. In other words, the postal issues of all defunct nations or states may now be reproduced without risk of conflict with the law.

"Approximately 130 stamp-issuing nations and colonies of the past are affected, including: the German Empire, the Russian Empire, the former kingdom of Hungary, Portugal and Spain, the Spanish regimes in Cuba and the Philippines prior to 1898, and the erstwhile empires of Brazil and Mexico.

"As most collectors already know, there is a strict American law forbidding the illustrating of all stamps of present-day national governments. Certainly the ruling is a good one. It has prevented the manufacture of counterfeits which would have flooded the philatelic markets and hurt philately as a recreation, a cultural study and a business.

"However, now that the statute has been liberalized by the Treasury Department, collectors will have to be on guard against frauds and fakes as never before in a generation."

Japanese stamps are counterfeited most prolifically of any in the world, Mr. Robinette says. Particularly is this true of the early issues, of the period between 1871 and 1875, when most of the Nipponese stamps were ornamented with dragons and chrysanthemums. Today the finest genuine varieties of this group catalogue up to $100 apiece.

Numerically speaking, Swiss counterfeits run a pretty close second to the Japanese fakes, claims Robinette. Next in order come

[*Continued on page* 120]

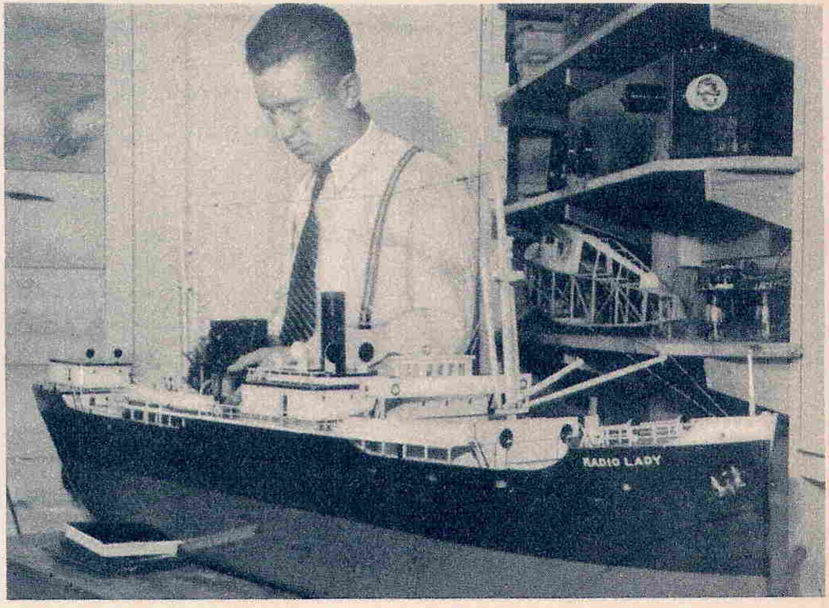
Below — Illustrating methods of stamp counterfeiting. By deft maneuvers with pen and ink, the dishonest "expert" can fake cancellations, and with the help of water colors, he can fake almost every color known. Some of these changed stamps are almost perfect reproductions.

Above—A device invented by Mr. Barr for detecting frauds. It is a very powerful, self-illuminating microscope holding its own battery. This device magnifies stamps 30 times and has already proved its efficiency by revealing counterfeits which otherwise would have been extremely difficult to detect even by the most expert philatelist.

Six-foot Ship Model Features Radio Control

A MINIATURE radio operated ocean liner that can be controlled within a one-mile radius by its "skipper" on shore has been constructed by Felix La Vallee, of Hugo, Minn. The *Radio Lady,* as the ship model is named, operates on five-meter ultra-short waves, and twelve different controlling operations can be performed. A selector switch and a time relay inside the ship make the electric contacts that cause the ship to respond to the control signals transmitted from the shore.

The ship model is six feet long, with an 11-inch beam, and weighs about 100 pounds with batteries and radio equipment installed. The hull, of glued and doweled wood layers, is divided into water-tight compartments that hold the various units of the controlling apparatus and other operating mechanism.

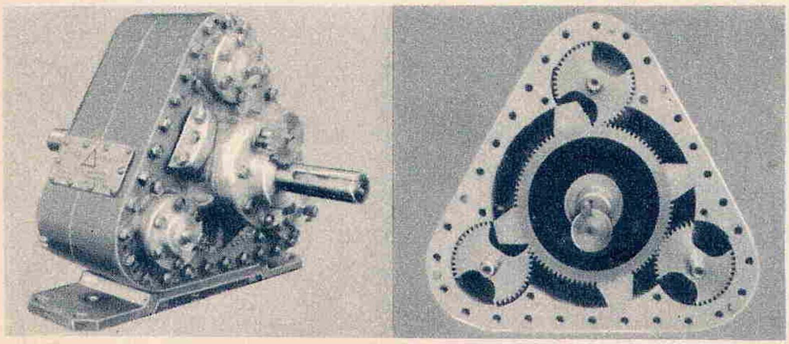


Controlled by radio, this ship model built by Felix La Vallee executes 12 different operations, such as turning, reversing, moving forward at quarter, half, or full speed, tooting a whistle, and turning navigation lights on or off.

Kinetic Energy Motor

A KINETIC energy motor developed for marine use has only four working parts—three valves and a rotor. The rotor has four vanes which act as pistons and the valves perform the work of cylinder heads.

Steam admitted through an inlet port passes into a space automatically opened by the timed action of a valve. As the valve turns, the steam expands and pushes a vane, propelling the rotor shaft, after which the steam escapes through an exhaust port. Twelve impulse strokes per revolution are imparted by the motor which is claimed to be the most efficient of its type.



Maximum power at low speed is available with this kinetic energy motor, shown covered and uncovered. Steam entering through an inlet port activates the vanes of the rotor, moving its shaft, to which a propeller can be attached.

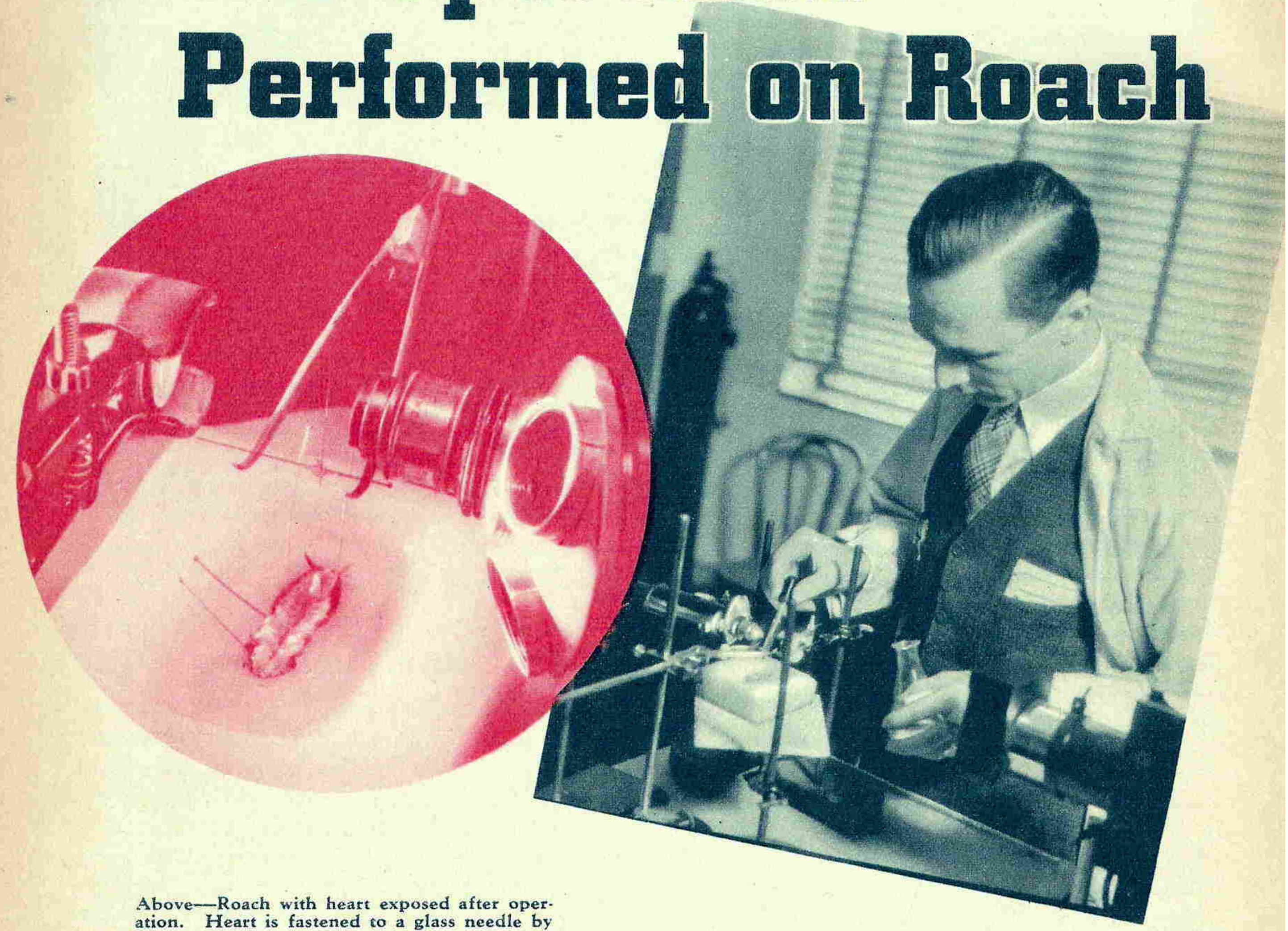
Radio Bares Oil Line Taps

A NOVEL radio tap-finder system patented by J. D. Munton and William O. Reeves and assigned to a leading oil producing firm enables pipe line inspectors to detect illegal underground taps no matter how cleverly they are concealed from the human eye. The system is expected to reduce the "bootlegging" of oil from isolated sections of the buried pipe lines which lead from the oil fields to distant refineries.

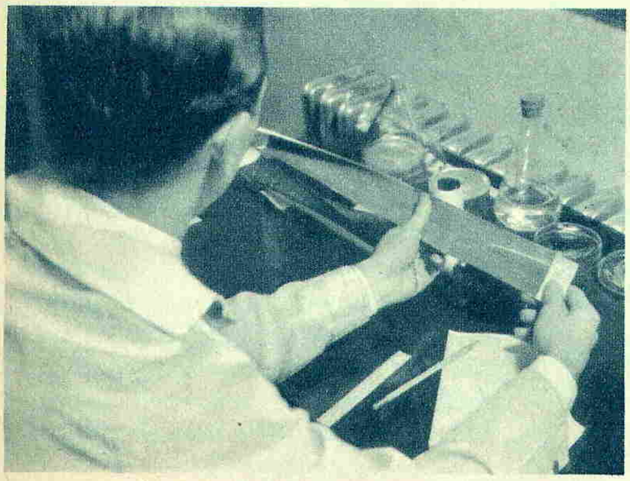
The system sets up electrical oscillations in the pipe line, forming an electric field which has a characteristic pattern if the pipe line runs along without side taps. Inspectors walk above the buried pipe wearing earphones connected to a radio detector device which is activated by the pipe line signals.

When a buried tap is reached, a warning hum is heard in the earphones. Auxiliary instruments, more accurate than the audible signal device, are then used to tell roughly the size of the buried object causing the hum. The inspectors quickly learn to tell the exact point where an illegal tap-off has been made, eliminating the former expense incurred by the oil companies in sending out crews to dig at points where taps were falsely believed to have been made by the oil bootleggers.

Heart Operation Performed on Roach



Above—Roach with heart exposed after operation. Heart is fastened to a glass needle by a single hair. Bright light thrown across the needle casts a shadow on the film, thereby showing each pulse as heart moves needle. Above, right—Another view of the delicate surgical operation. Dr. J. Franklin Yeager is shown anesthetizing the roach just before its heart throbs are recorded. Below—Prints of the heart beats telling a story never before revealed to medical science.



STRANGER and more precise than anything of the sort ever attempted before was the surgical operation recently performed in Washington on a lowly cockroach. With an ultra-sensitive instrument called the "mechanocardiograph," Dr. J. Franklin Yeager, Department of Agriculture entomologist, recorded the heart-throbs of the insect and for the first time in history recorded their every movement. The idea was to get at the fundamental facts of insect heart action to help man in his never-ending efforts to outwit the millions of bugs that cost the nation billions of dollars annually in destroyed fruits, vegetables and trees.

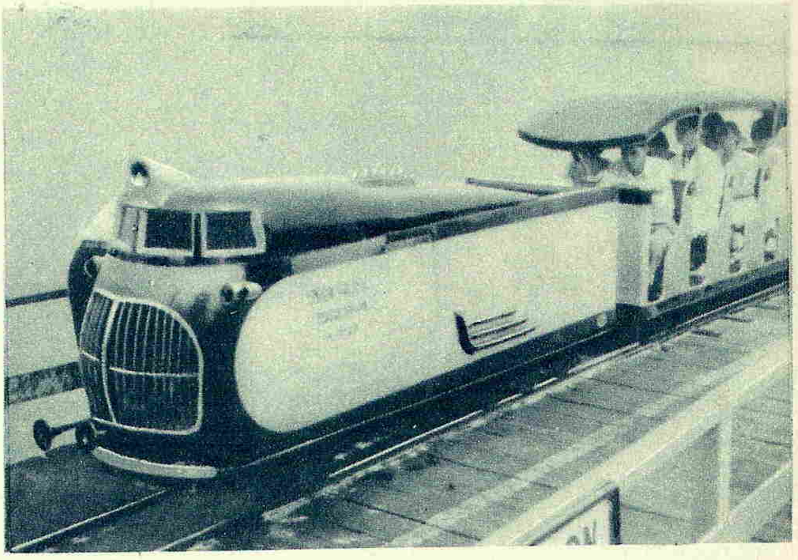
Dr. Yeager's instruments, procedure and results were unlike anything hitherto known. The first of his many delicate tasks was a surgical maneuver. He put a bit of anesthetic on the cockroach, cut open its body so the heart was exposed, and pinned down the

[*Continued on page* 131]

Midget Streamlined "Locomotive" Thrills Crowds

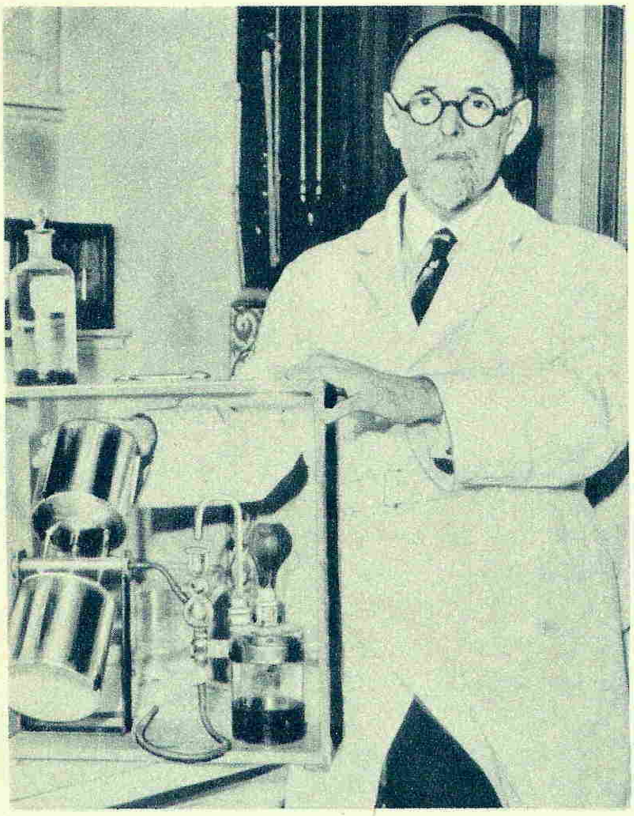
CHILDREN and grown-ups alike are thrilled by a ride in a miniature excursion train at Seaside Beach, Md., which is pulled by a midget streamlined "locomotive." Pulling a string of open observation cars, the streamliner shuttles back and forth over the heads of bathers in the water below a half-mile long pier.

The "locomotive" consists of a special chassis featuring a Ford auto engine and covered with a body resembling a Union Pacific streamlined engine. The train's wheels are guided by a narrow-gauge track.



This miniature Union Pacific streamlined "locomotive" is powered by a Ford automobile engine. It pulls a train of observation cars over a half-mile pier at a Maryland beach.

Apparatus Detects Gases



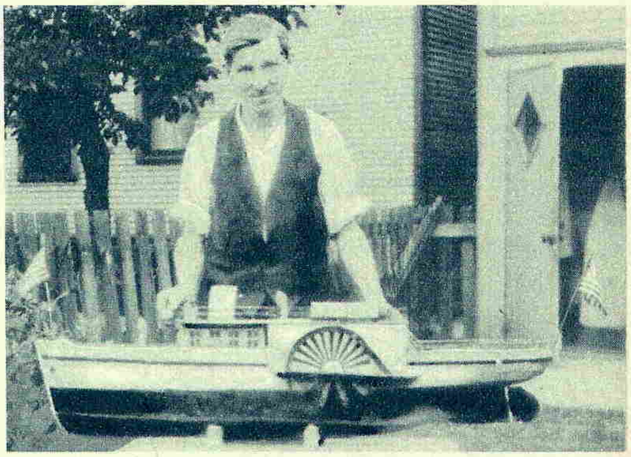
Developed by M. Kling in the chemical laboratory of the Paris (France) Police Department, this apparatus detects presence of poisonous gases by discoloration of liquids.

AN APPARATUS for detecting the presence of poisonous gases by registering the discoloration of special liquids placed within its chambers has been developed by M. Kling, director of the chemical laboratory maintained by the Paris (France) Police Department. Conversely, the apparatus indicates when danger has passed.

Model Steamship Functions

A PRACTICAL miniature steamboat has been constructed from scrap metal parts by James Pierce, a power plant engineer of Milwaukee, Wis. The hand-made model has an alcohol lamp which heats water in a small boiler to provide the steam power for motivating the boat.

The steam is run into alternating triple pistons which drive a shaft connected to paddle wheels on each side of the model. Tests have proved that the boat can travel quite some distance before it is necessary to refuel. The craft is four feet long, nine inches wide amidship, and weighs eighteen pounds. The model's design resembles that of large boats now in general use.



Built from scrap metal parts by James Pierce, of Milwaukee, Wis., this model steamboat has a steam engine that enables it to travel short distances on a very small amount of fuel.

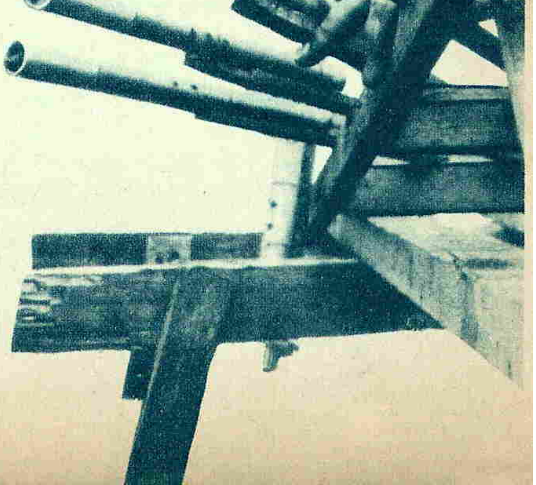
FIREWORKS for FESTIVALS

by
Benn Hall

A MERICA spends more than $5,000,000 each year to express, by means of colorful and noisy fireworks her patriotic and religious fervor. It's a neat little business, the pyrotechnic industry, and has grown tremendously since prehistoric man dabbled in his mute way with the wonder of fire and the fury of sound. It has expanded, too, since that more modern occasion in the 13th century when gunpowder was given to the world and changed history—and methods of celebrating those historical changes.

The industry of fireworks grew with leaps and bounds through the 17th, 18th and 19th centuries and today it is an international trade, with its manufacturers, workers, opponents, bootleggers, sweatshops and all that is part and parcel of the American industrial scene.

Fireworks manufacturing has developed, in its own specialized fashion, into a luxury business. The way to celebrate



America's freedom and her religious feast days is to ignite little, cylindrical red stubs or to light longer, fused affairs which dart through the air with great speed and considerable ease. It isn't utterly essential, of course, that we celebrate thusly, but it is a tradition, and traditions have a way of persisting. Hence the fireworks manufacturers are nicely established, although they are thought of only once or twice every year.

The patriotic or religious display of fireworks, with its booms, smells, sky pictures and appeal, is a peace-time symbol of the battlefield—the child's way of viewing war—some of the thrills, noise and flashes and little of the danger of actual bloody combat. It isn't altogether a realistic picture, if one is to see the thing through, but it possesses the appeal of the parade, if not of the casualty list.

America has, of course, no monopoly on the celebrating of holidays with fireworks. China and Japan use them for many occasions; France on Bastille Day; England on Guy Fawkes Day. Most other European and Latin American countries have their holidays when fireworks are in demand.

Not all the fireworks sold in the United States in 1936 was bought to amuse Junior. About fifty per cent of the sales was to industrial and governmental bureaus. The

Americans pay more than $5,000,000 annually to express patriotic and religious fervor.

Opposite page (circle)—A July 14th celebration in France known as "Bastille Day." Fireworks are used to celebrate the fall of the Bastille very much in the same manner as they are used in the U. S. to celebrate July 4th. Above—Here is a large aerial display showing the various levels at which different pieces "open." Left—A worker preparing the display which, when ignited, will produce a large palm tree effect.

flares and signal lights used at sea and for military signaling and aeroplane use are all part of the pyrotechnic industry—half of it, in fact.

The United States government conducts a "fireworks college" in Washington, D. C., where bombs, flares and other military devices are studied. That American fairyland, Hollywood, consumes a share of the firework output. Movieland needs pyrotechnics for effects in battles and explosions, and uses smoke bombs for artificial blazes.

And fireworks are used for sham battles. There is the yarn told of a Central American general who faced a revolution. He is said to have ordered several cases of fireworks and to have frightened off skittish revolutionists with them.

The trade calls about forty-five per cent of its sales "commercial"; that is, the goods John J. Public buys for his children—and for his own fun. This buying is seasonal. Part of the sales, five per cent or so, is known as "display" sales—goods sold to amusement parks, fairs, municipalities for celebrating the Fourth and other occasions. Many amusement parks have found it a paying policy to devote part of one evening each week to a fireworks display. Several state fairs have reported increased attendance because of nightly showings of fireworks. Such large-scale exhibits include eye-dazzling spectacles —much more than mere noise for noise's sake. The sky serves as a stage background for elaborate displays of rockets, candles and more complex displays. It is possible that if the Dionne lassies were "done in pyrotechnics" they would possess far greater "human appeal" than any other display!

Several cities that have banned the sale of fireworks have taken it upon themselves to furnish their taxpayers with safer displays, handled by experts. Milwaukee is one city which has done so.

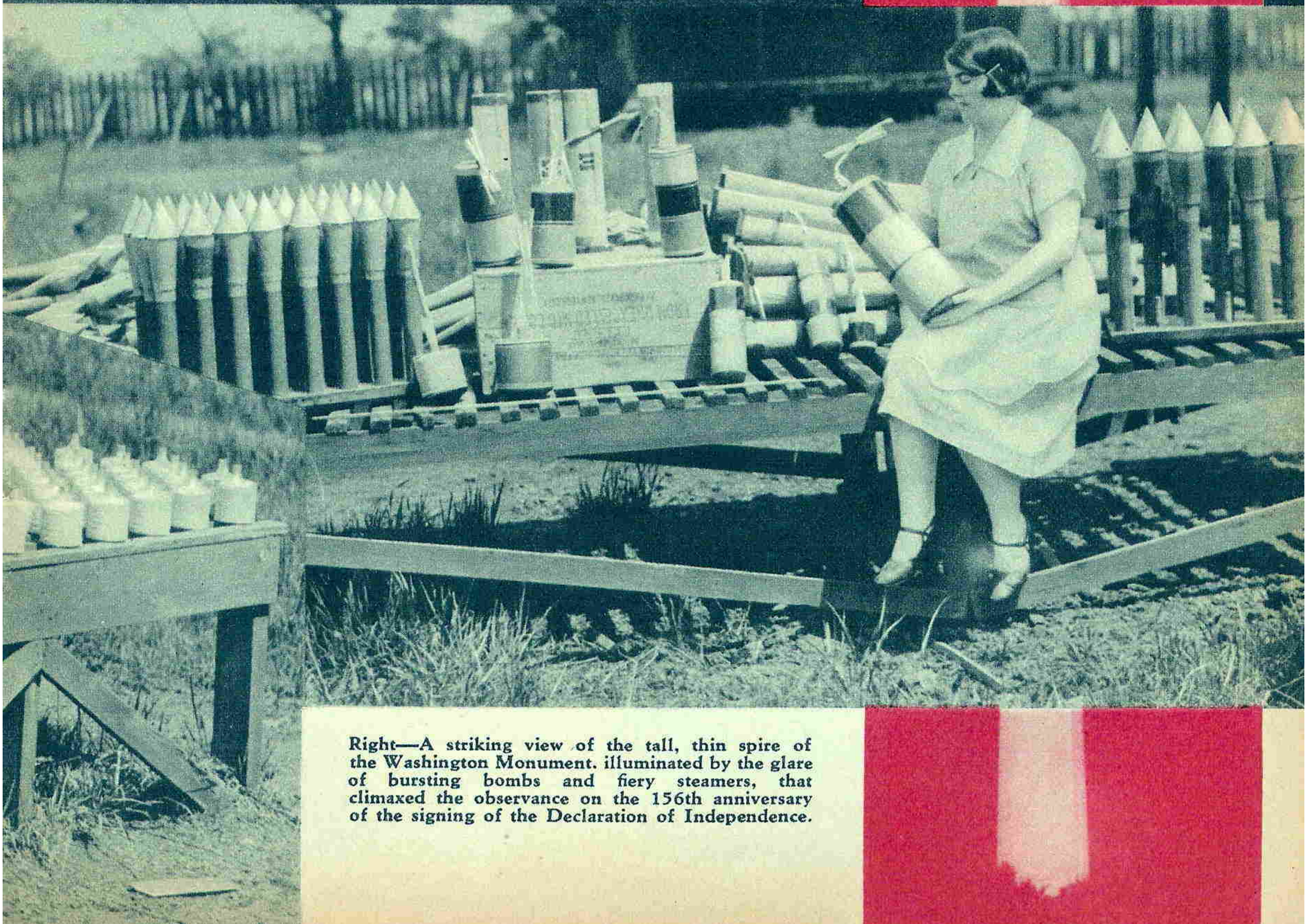
The "commercial" or public trade is divided into two seasons. The Fourth of July is celebrated in the north and in most other sections of the country with fireworks. But in the south it is Christmas that is celebrated with pyrotechnic outbursts. The reason for the southland doing this is not clear. Evidently several factors are involved. The intense July heat may discourage the added heat wave generated by fireworks. And it may

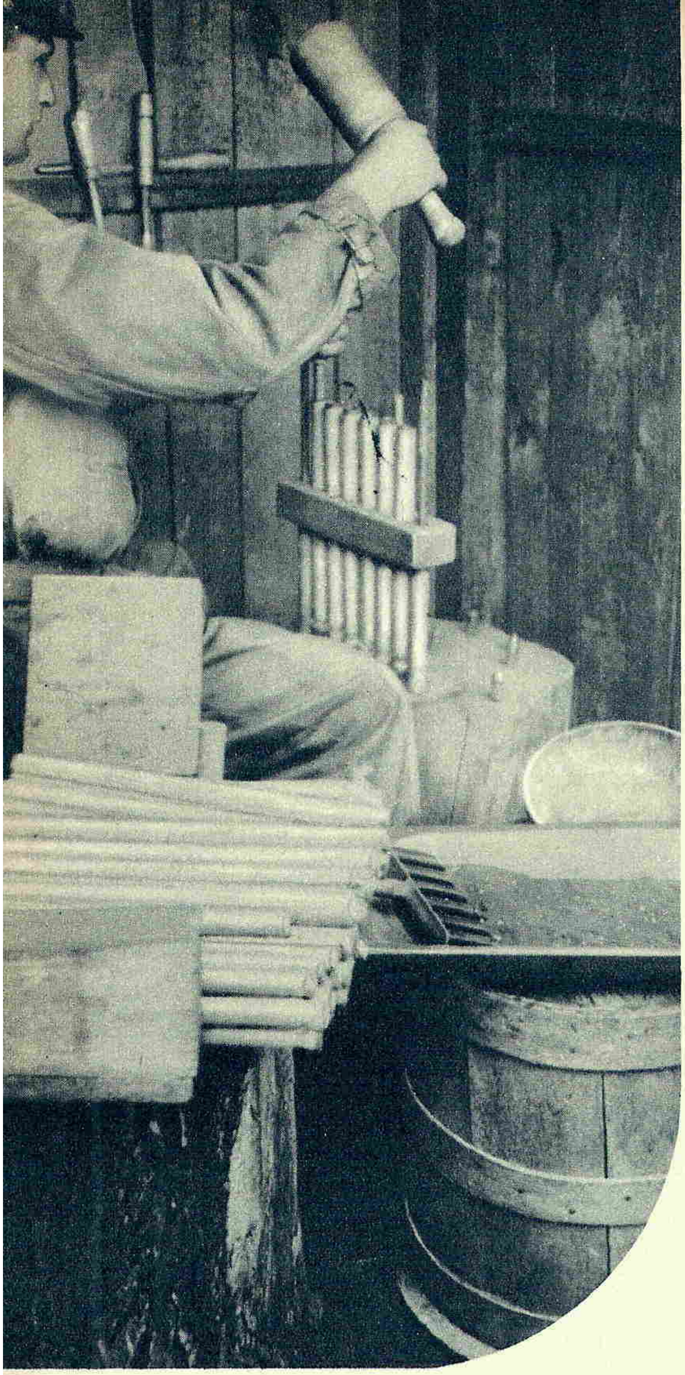
Below—Fireworks dried in the sun are more effective than those dried by other means. Manufacturers employ extreme caution to prevent accidents. Each worker or group of workers is kept separate from the rest.

be that the Fourth of July is, to some southerners, something of a lesser holiday, that is, compared to the way in which it is celebrated in the north. When there is snow on the ground, the spectacle of the colored displays against a white blanket is a gorgeous pageant that the northern Fourth lacks. In any event, it suits the manufacturers and gives them two seasons, just like the makers of clothes and other commodities.

"Commercial" fireworks may be grouped into five general classes with various subdivisions. These five are: (A) Firecrackers—the most popular. (B) Roman candles which discharge flaming colored balls or stars or both. Salts of various metals are used for color—barium for green, aluminum for white, copper for blue and strontium for red. (C) Skyrockets are very popular. At one end is a cap and at the other a stick to stabilize the flight to the heavens. The tube itself is filled with a rapidly-burning composition in which are mingled the stars or pellets. A composition of quick and slow burning powder is packed in very lightly. A fuse runs down a hole through the length of the powder. When ignited, the fuse fires the powder. Gases are generated and the rocket is propelled into the air. At its hight, the explosive powders are ignited and the stars and serpents and other objects fly in all directions. (D) Pinwheels. Spitting fire rotates a burning wheel supported by a central pin. (E) Set pieces which give showers of colored sparks or flames or form pictures of fire in the air. Pictures over 600 feet long and 50 feet

Right—A striking view of the tall, thin spire of the Washington Monument, illuminated by the glare of bursting bombs and fiery steamers, that climaxed the observance on the 156th anniversary of the signing of the Declaration of Independence.





high have been produced at Crystal Palace, London, where set pieces have been highly developed.

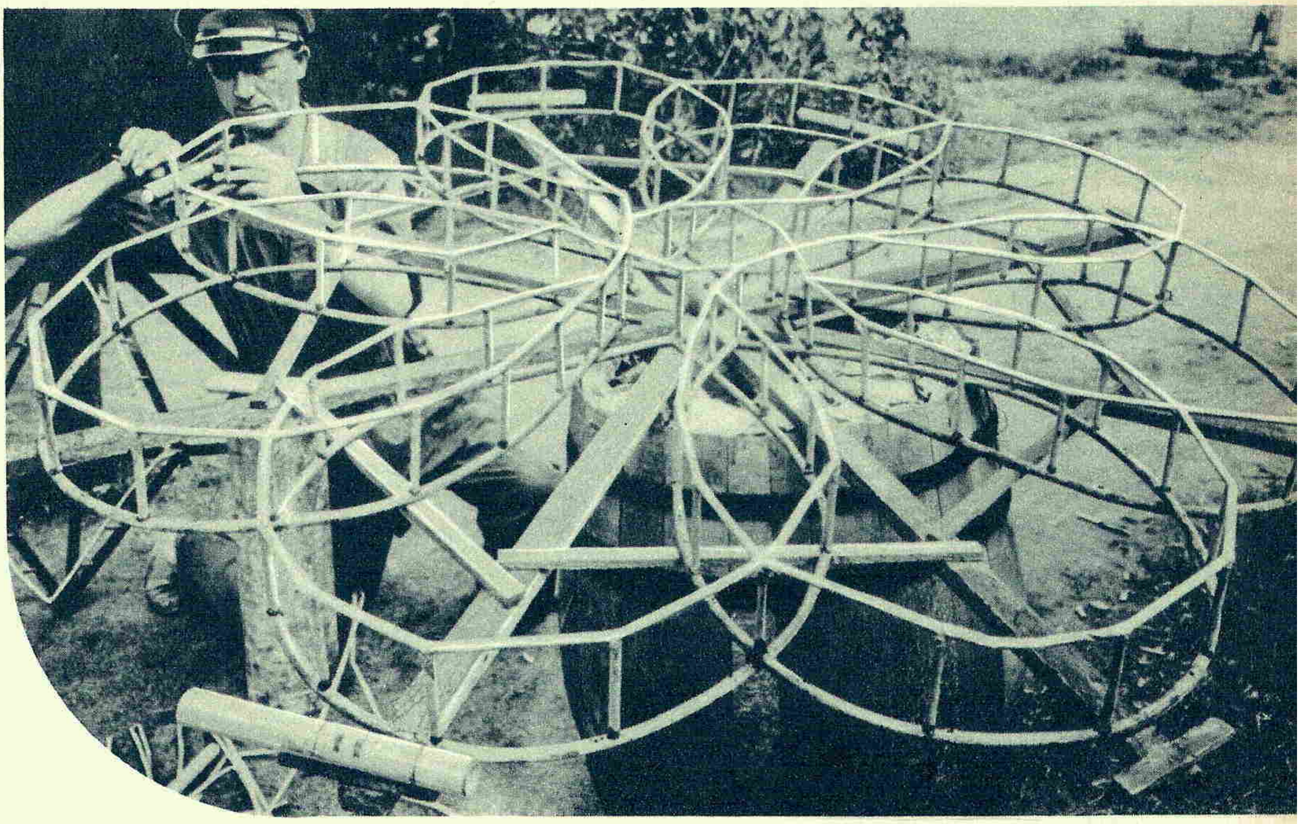
The material for fireworks — gunpowder and other ingredients — is purchased from various manufacturers and then mixed by the pyrotechnic manufacturers. Discoveries and inventions made within the past two hundred

Left—One of the last steps in manufacture of rockets. In one of many small buildings comprising the plant, worker fills the cardboard tube with various types of powder necessary for obtaining desired effect. Extreme caution is used in the handling of material.

Below—Climax of a monstrous display. A battleship outlined by fire forms major part of the spectacle. Carefully constructed bombs and flares are responsible for this final scene. Although lasting but a few seconds, hundreds of hours of preparation were necessary before result shown could be achieved.

years have made many of the now-common effects possible. Yellow sand is introduced to secure golden glows. Camphor produces a fine flame; it is used with aromatic perfumes which mask the unpleasant smells of other ingredients.

Manufacturers are extremely cautious as to the handling of fireworks material. One plant consists of about 200 tiny buildings spread over 100 acres of meadows. Workers, one or two to a shack, keep but a small supply of materials on hand—enough for a half an hour or so. This supply is constantly replenished from a central source. Precautions are taken to see that no accidental combinations of chemicals occur. Workmen in one building handling one type material may not enter on that day another building housing different material. The charging houses are very frail, and will practically fall apart at the suggestion of an explosion. The wind, too, is watched, and when it blows the wrong way or too strongly, the plant, which is located in Staten Island, N. Y., is shut down.



Above—A worker giving the final touch to a large fire wheel. Carefully constructed and in good balance this wheel, when ignited, will turn slowly or rapidly as desired, and show itself in flaming outline.

The $5,000,000 of reported sales were made, for the most part, in America. The export trade is quite meager because of the expenses involved and also because salt air would injure some of the fireworks. But the importing of Chinese "flash" crackers bothers American manufacturers. Statistics show that about 65 per cent of all firecrackers used in this country are made in China.

This means that Chinese coolie labor is in fairly direct competition with American labor. Manufacturers say that our workers' daily pay of from four to six dollars equals a

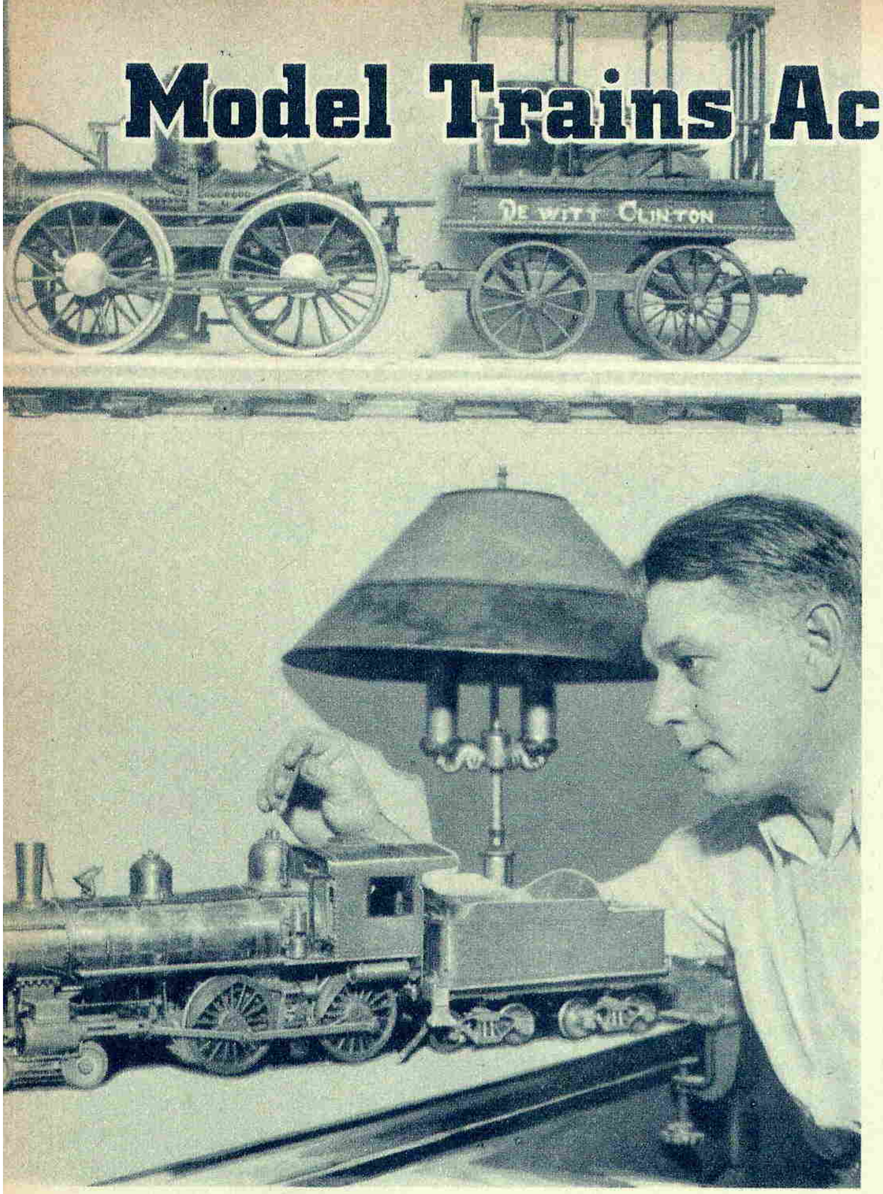
[*Continued on page* 122]

Model Trains Actually Run

A COMPLETE working model of an early type railroad locomotive has been made by Lynn Rolen, head machinist of the Little Rock, Ark., railroad shops.

The model is complete to scale in every detail and required nearly four years to complete. A scale model of the famous DeWitt Clinton also was constructed by Mr. Rolen.

He makes most of his own tools and constructs his models from plans of full size machines. A patient and painstaking workman, Mr. Rolen admits that his biggest thrill comes from finding inaccuracies in original drawings and having his discoveries acknowledged by the company which issued the drawings.



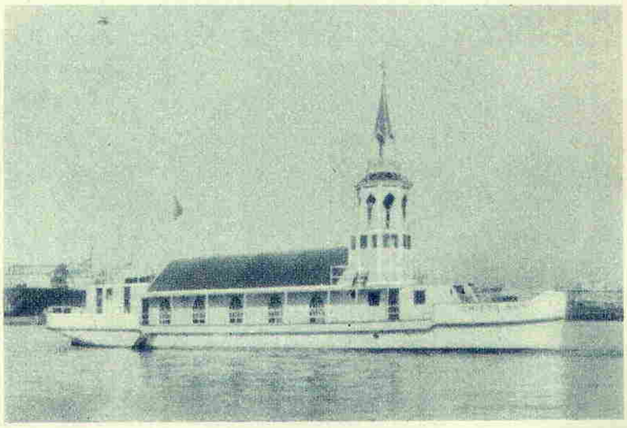
Lynn Rolen, Little Rock, Ark., railroad shop machinist, and two of his scale-model locomotives. At the top is seen a model of the famous De Witt Clinton. Besides making models, he also makes many of his own tools.

Church Goes To Sea

WHEN the congregation can't go to church, the church goes to the congregation, along the Parana River in the Argentine.

This floating church, 108 feet long, has steeple, stained glass windows and altar. Built in the government's Buenos Aires shipyard, the hull of an old vessel was transformed into a church by the Lincoln arc-weld process.

Before this floating church made its appearance, many of the church-goers of that section were unable to attend formal worship.



The "Cristo Rey," the world's first floating church, in use on the Parana River, Argentine. Vessel was built because the congregation many times found it impossible to attend church.

Flashlights Get New Bulbs

A UNIFORMLY more powerful and more concentrated beam of light from flashlights is produced by this new prefocused flashlight lamp, according to Westinghouse lamp engineers.

Accurate alignment of the filament is assured by placing one end of the filament support wires in pit of pear-shaped glass bulb and by positioning bulb in the new lamp base within exceedingly small clearance.

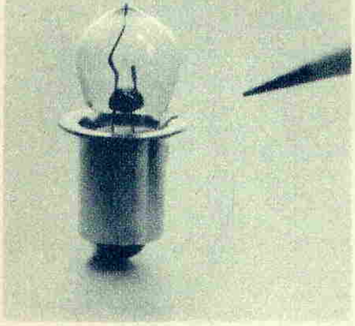
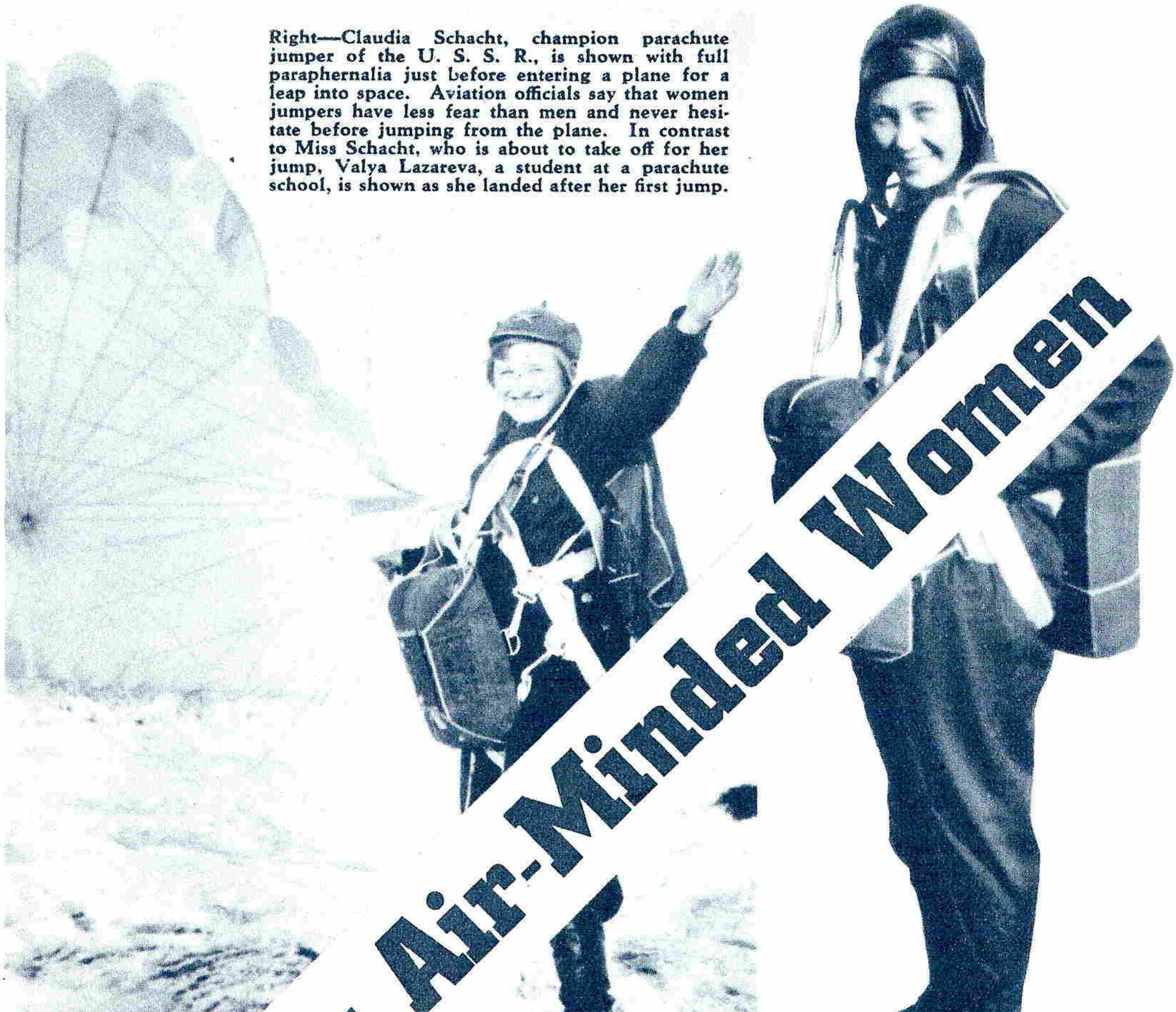


Photo shows size of new bulb as compared to pencil point.

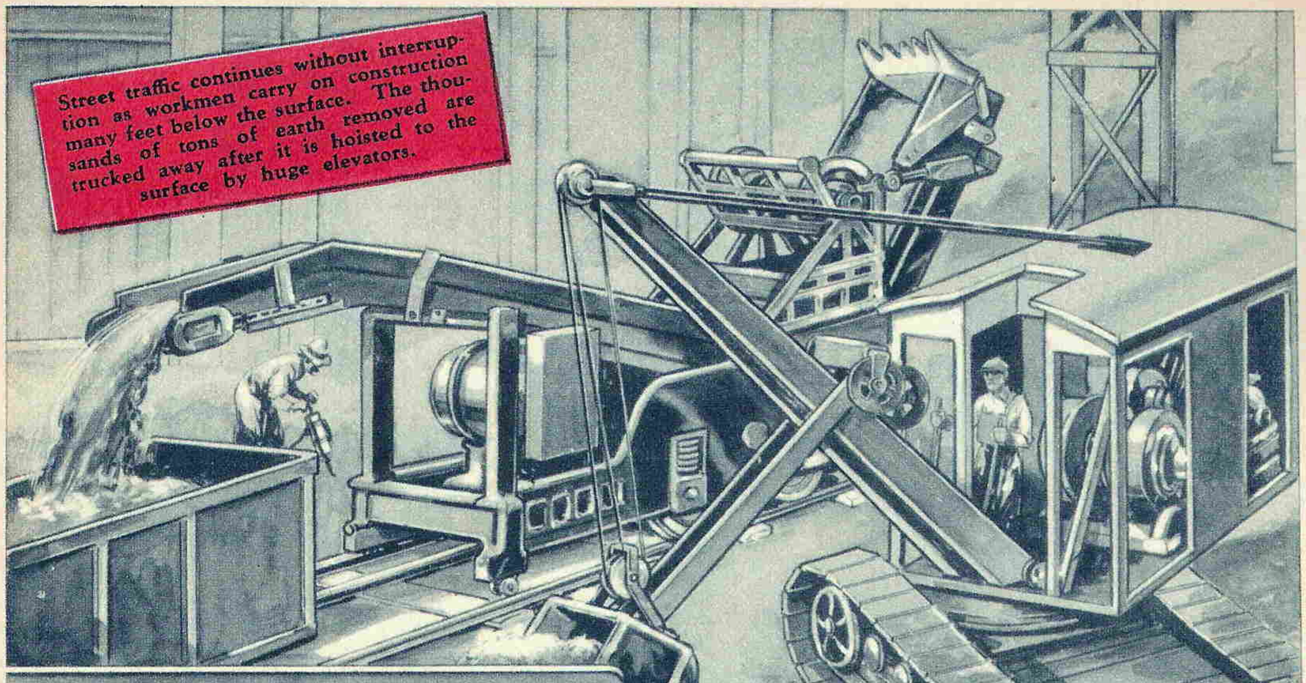
Russia's Air-Minded Women



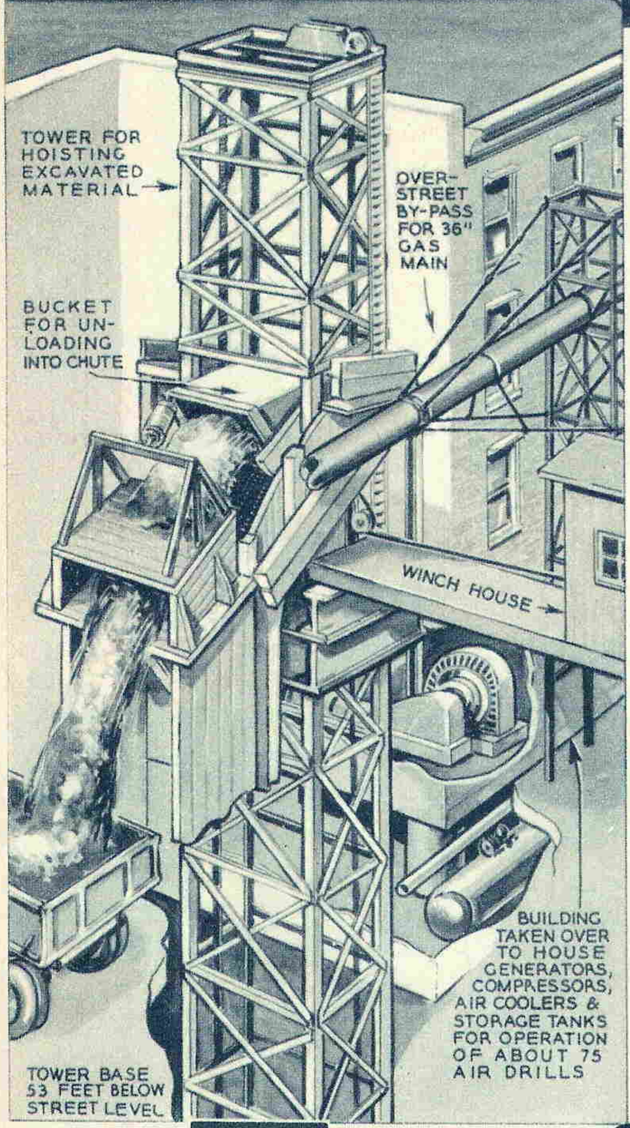
Right—Claudia Schacht, champion parachute jumper of the U. S. S. R., is shown with full paraphernalia just before entering a plane for a leap into space. Aviation officials say that women jumpers have less fear than men and never hesitate before jumping from the plane. In contrast to Miss Schacht, who is about to take off for her jump, Valya Lazareva, a student at a parachute school, is shown as she landed after her first jump.

Above—Mirra Zeidenberg, first woman airplane mechanic of the Soviet Republic, is shown at work on a motor at a military flying field. The daughter of a Kiev slaughter-house worker, she started her airplane studies after having worked 14 years in a glass factory. Completing her studies, she was stationed at the Military-Technical Institute of the Air Force.

THE SUBWAY



Street traffic continues without interruption as workmen carry on construction many feet below the surface. The thousands of tons of earth removed are trucked away after it is hoisted to the surface by huge elevators.


TOWER FOR HOISTING EXCAVATED MATERIAL
OVER-STREET BY-PASS FOR 36" GAS MAIN
BUCKET FOR UNLOADING INTO CHUTE
WINCH HOUSE
BUILDING TAKEN OVER TO HOUSE GENERATORS, COMPRESSORS, AIR COOLERS & STORAGE TANKS FOR OPERATION OF ABOUT 75 AIR DRILLS
TOWER BASE 53 FEET BELOW STREET LEVEL

Street traffic goes on as usual while gigantic construction project approaches completion many feet below.

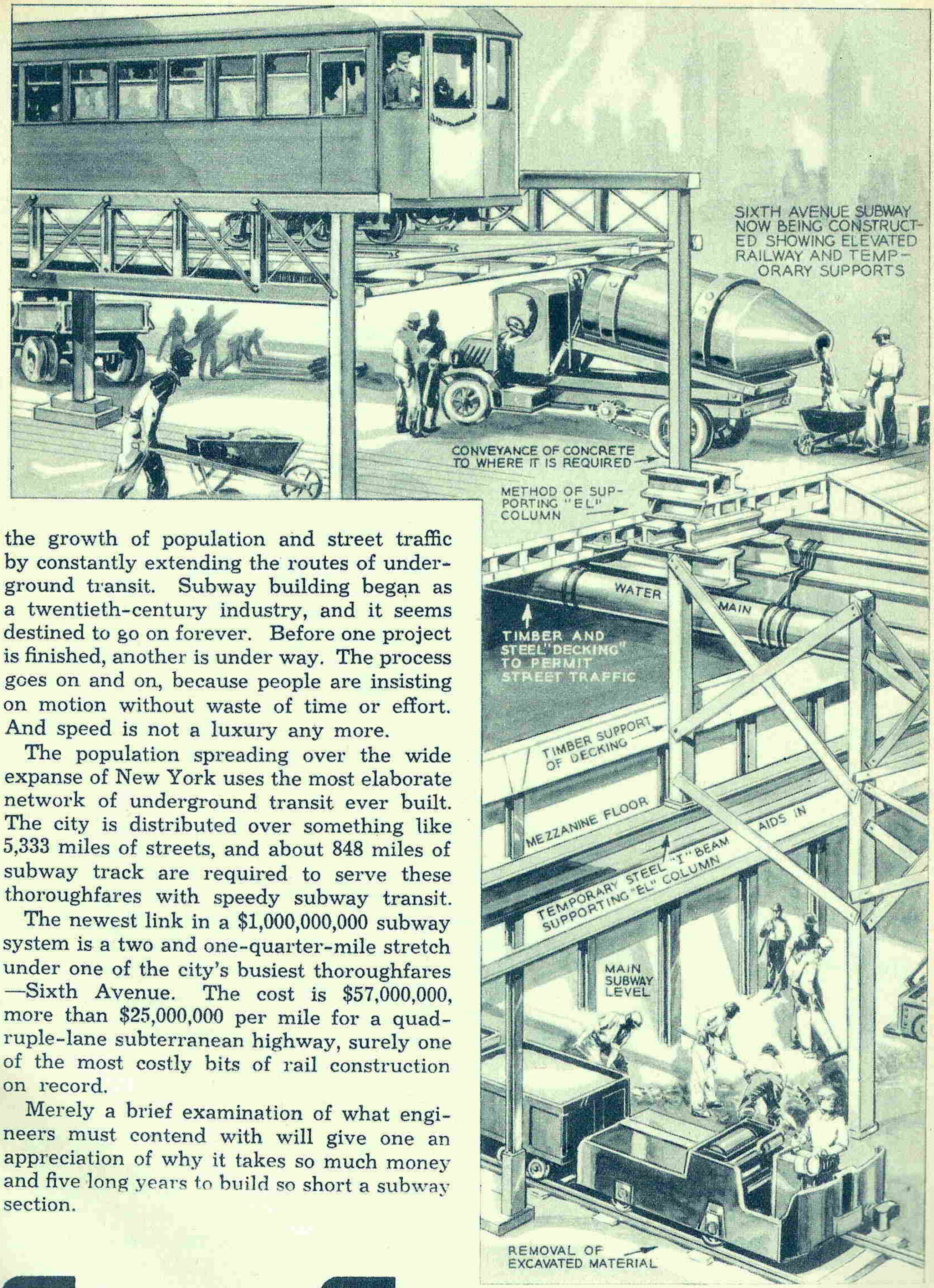
by

Don Glassman

UNDERGROUND flyers crashing through caves of darkness serve the largest metropolitan population in the world—New York. They carry people to and fro every minute of the year; storm, rain, snow or ice—nothing stops them. Under rivers, streets, skyscrapers, occasionally coming up for a breath of light and air, the trains for the most part run underground where the running is good and the tracks are clear.

Fancy running New York or London without subway traffic. It can't be done! So long as huge cities flourish, so long as we have street congestion, underground travel is the easiest solution to our problem. Experience proves it.

The world's greatest cities keep pace with


SIXTH AVENUE SUBWAY NOW BEING CONSTRUCTED SHOWING ELEVATED RAILWAY AND TEMPORARY SUPPORTS
CONVEYANCE OF CONCRETE TO WHERE IT IS REQUIRED
METHOD OF SUPPORTING "EL" COLUMN
WATER MAIN
TIMBER AND STEEL "DECKING" TO PERMIT STREET TRAFFIC
TIMBER SUPPORT OF DECKING
MEZZANINE FLOOR
TEMPORARY STEEL "I" BEAM AIDS IN SUPPORTING "EL" COLUMN
MAIN SUBWAY LEVEL
REMOVAL OF EXCAVATED MATERIAL

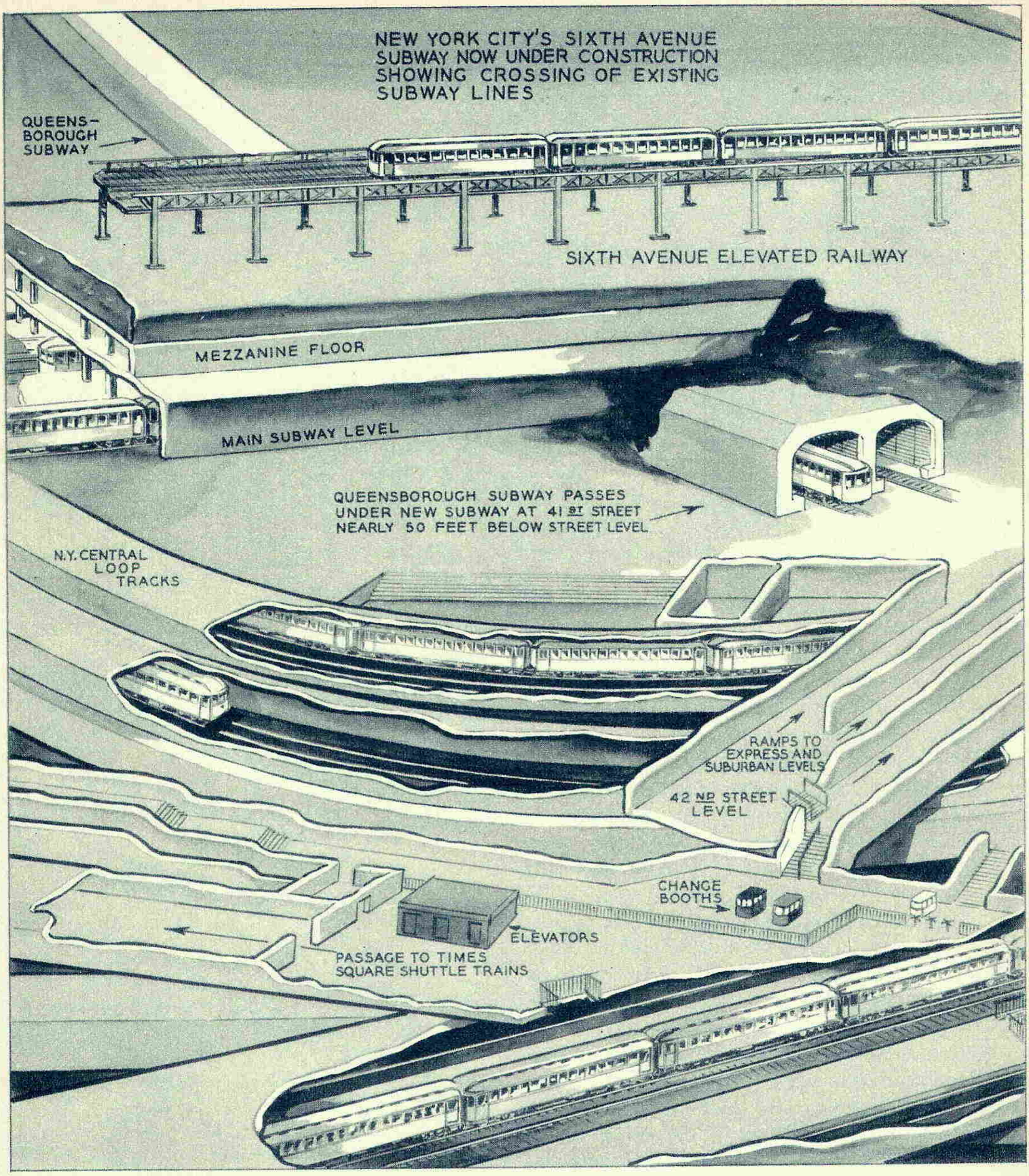
the growth of population and street traffic by constantly extending the routes of underground transit. Subway building began as a twentieth-century industry, and it seems destined to go on forever. Before one project is finished, another is under way. The process goes on and on, because people are insisting on motion without waste of time or effort. And speed is not a luxury any more.

The population spreading over the wide expanse of New York uses the most elaborate network of underground transit ever built. The city is distributed over something like 5,333 miles of streets, and about 848 miles of subway track are required to serve these thoroughfares with speedy subway transit.

The newest link in a $1,000,000,000 subway system is a two and one-quarter-mile stretch under one of the city's busiest thoroughfares —Sixth Avenue. The cost is $57,000,000, more than $25,000,000 per mile for a quadruple-lane subterranean highway, surely one of the most costly bits of rail construction on record.

Merely a brief examination of what engineers must contend with will give one an appreciation of why it takes so much money and five long years to build so short a subway section.

CITY GROWS

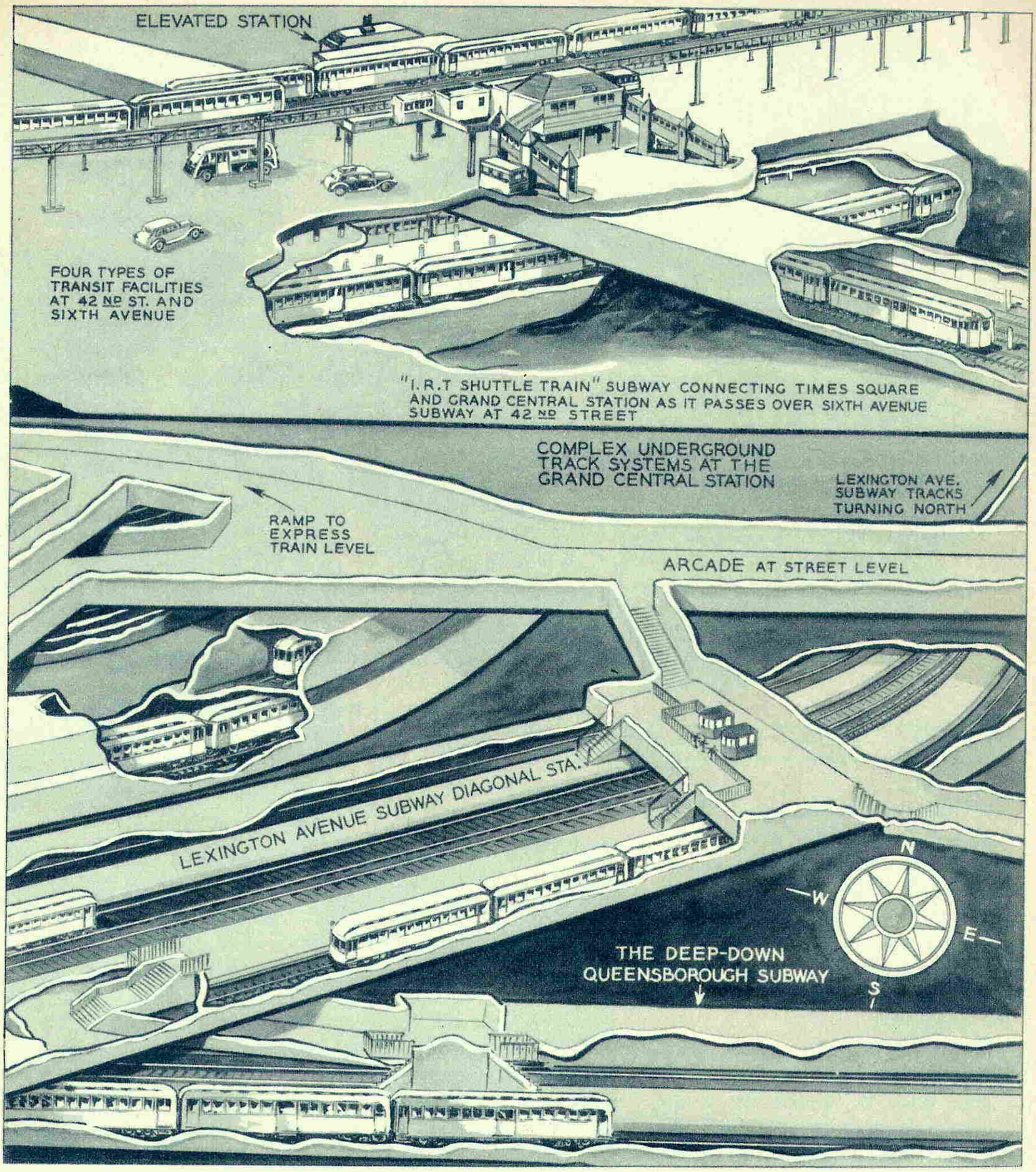

NEW YORK CITY'S SIXTH AVENUE SUBWAY NOW UNDER CONSTRUCTION SHOWING CROSSING OF EXISTING SUBWAY LINES
QUEENS-BOROUGH SUBWAY
SIXTH AVENUE ELEVATED RAILWAY
MEZZANINE FLOOR
MAIN SUBWAY LEVEL
QUEENSBOROUGH SUBWAY PASSES UNDER NEW SUBWAY AT 41ST STREET NEARLY 50 FEET BELOW STREET LEVEL
N.Y. CENTRAL LOOP TRACKS
RAMPS TO EXPRESS AND SUBURBAN LEVELS
42ND STREET LEVEL
CHANGE BOOTHS
ELEVATORS
PASSAGE TO TIMES SQUARE SHUTTLE TRAINS

An artist's drawing of the intricate network of subway arteries below the busy streets of New York City. The Sixth Avenue Elevated line continues its operation and business goes on as usual during the period of subway construction many feet below.

In the first place, the overhead street traffic must go on day and night as if there were no construction below. Heavy busses, trucks and other surface vehicles travel the roadway constantly. Also, the same street supports the pillars of an elevated train structure on which passenger trains are always running.

For twenty-four blocks of the distance, the new subway route runs above the tunnels of a high-speed interurban train. Under one

Newest link costs more than $25,000,000 per mile as public continues demand for more and more travel aids.


ELEVATED STATION
FOUR TYPES OF TRANSIT FACILITIES AT 42ND ST. AND SIXTH AVENUE
"I.R.T SHUTTLE TRAIN" SUBWAY CONNECTING TIMES SQUARE AND GRAND CENTRAL STATION AS IT PASSES OVER SIXTH AVENUE SUBWAY AT 42ND STREET
COMPLEX UNDERGROUND TRACK SYSTEMS AT THE GRAND CENTRAL STATION
LEXINGTON AVE. SUBWAY TRACKS TURNING NORTH
RAMP TO EXPRESS TRAIN LEVEL
ARCADE AT STREET LEVEL
LEXINGTON AVENUE SUBWAY DIAGONAL STA.
THE DEEP-DOWN QUEENSBOROUGH SUBWAY
N
W
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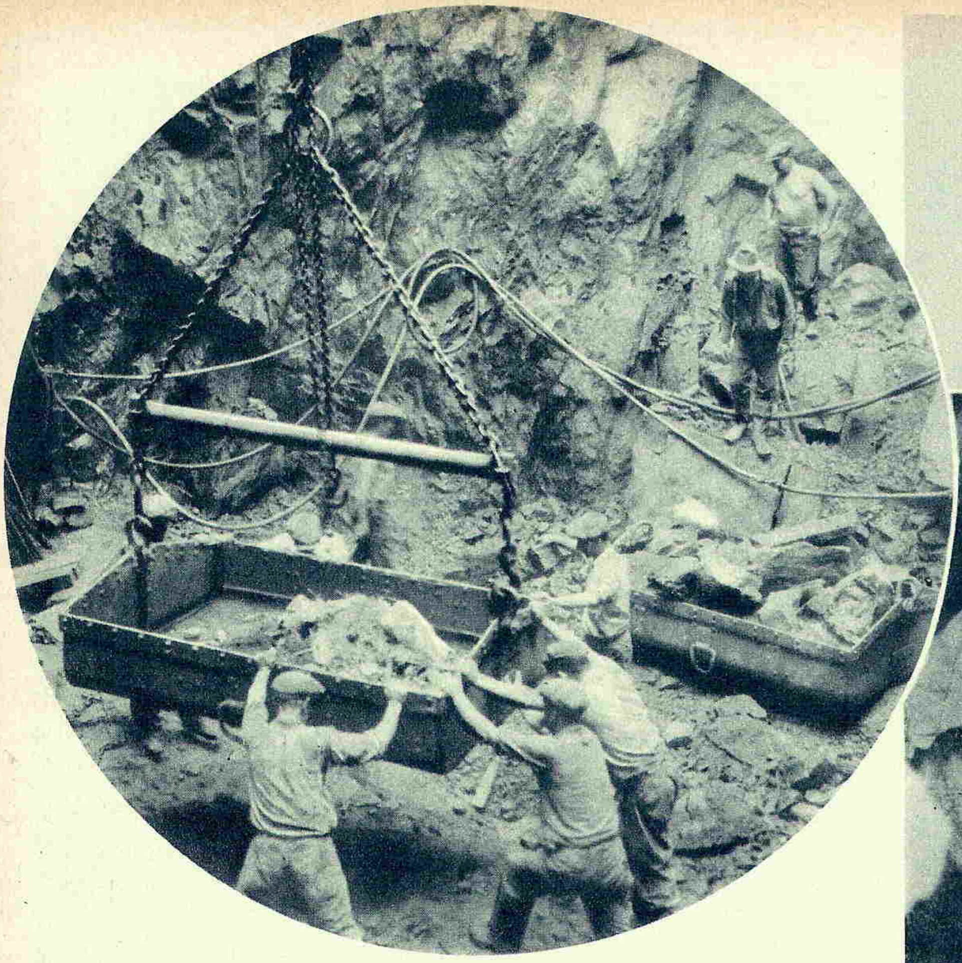
Shuttle train connecting Grand Central with Times Square will pass over Sixth Avenue subway at 42nd Street. Queensborough Subway operates at a depth considerably below Lexington Avenue line. Above both is complicated track system at Grand Central.

street intersection, it must leap over the Pennsylvania Railroad tunnels, dive under another subway and a tunnel, and support the elevated structure over the street.

To all this difficulty is added the presence of a seventeen-foot aqueduct from the Catskill Mountains, carrying a stream of clear water for the city's daily use. Gas mains, steam pipes, electric conduits, sewers, cables, sub-basements, and underground freshets

Subway travel gives public one of its biggest nickel's worth in form of a 26-mile trip under city streets.

Below—Patrick Halloran, a sand hog, climbs out of a 30-inch pipe under the Hudson River where the new Midtown Tunnel is nearing completion. Depth at which these men work regulates the amount of their pay. One of their most serious dangers is "bends," afflicting those who go from one pressure area to another too rapidly.



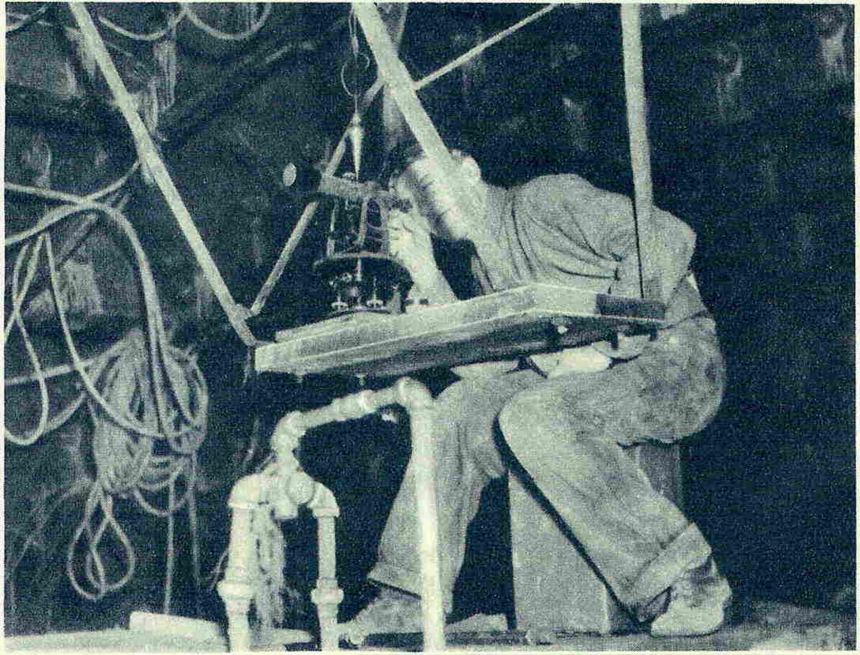
Excavators at work on the New York Midtown Tunnel. Thousands of tons of rock are lifted to the surface in huge buckets. Drill marks are still visible on the sides of the stone.

add to the difficulties. Skyscrapers must be pinned up, foundations carried down, cables separated, excavations removed, and concrete poured. Steel beams are pushed through narrow openings. Air drills attack the hard granite and drive holes for dynamite.

Then there is the underground blasting, most ticklish job of all. Every blast is "in the lap of the Gods." If it fails to go off according to plans, something gives way and perhaps the whole structure may tumble down. Careful calculations and the most painstaking labor enter into subway construction. Hundreds of thousands walk on the rough planks covering the streets, but few know what actually goes on below. Underwater tunnel construction is another industry that bids fair to develop into permanency. The East River takes the world's record with ten double-track underwater tunnels. Five immense bridges span this same channel.

Ever since the completion of the Holland Tunnel

[*Continued on page* 131]



Above—Surveyor W. H. Francisco checks the alignment of the tunnel beneath the Hudson River, to insure the correct position of the tunnel so that the portions started on opposite sides of the river meet exactly where planned.

Trailer Camp Brings Back Tepees For Sleeping

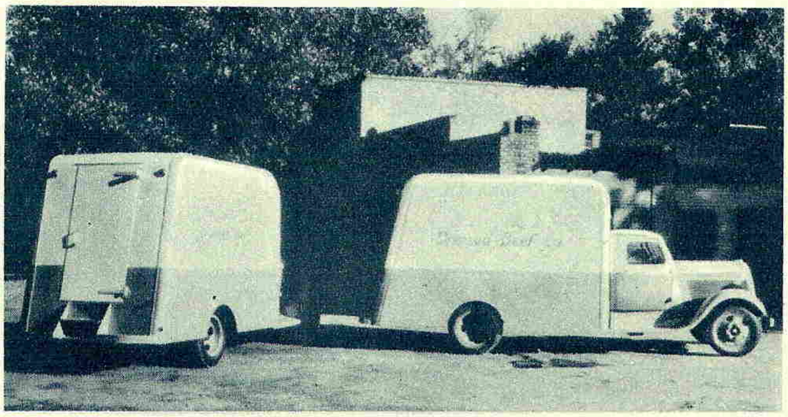
This trailer camp supplies tepees for its guests who do not wish to sleep in their trailers. Receiving considerable favor from the visitors, the privilege of sleeping in this ancient style brings as high a price as for the best rooms.

INDIAN tepees as sleeping quarters for guests is a novel arrangement offered by Bob Callahan of Los Angeles, proprietor of an auto and trailer court.

The entire court takes on an Indian atmosphere mixed with a touch of early California. Believed to be one of the most unusual courts in the country, an opportunity to sleep in a tepee is finding considerable favor with the visitors.

Although rooms are available for guests, the proprietor reports that tepees bring as high a price as the best of the regular rooms. Before opening this court, Mr. Callahan spent a portion of his life studying and writing about Indian life. As trailer design gives more and more of the convenience and comfort of home, many trailer camp proprietors are offering a more interesting instead of a more luxurious place to sleep. In keeping with this trend, Mr. Callahan has introduced this sleep-in-a-tepee idea.

Meat Is Delivered In Mechanically Refrigerated Truck



Dressed meats travel from wholesaler to retailer at a correctly mantained temperature in these trucks. A mechanical refrigerating plant operating from car engine gives 35-degree inside temperature regardless of outside conditions.

A MECHANICALLY refrigerated meat delivery truck, believed to be the first of its type in the country, is being operated by the Frank Banfield and Sons Dressed Beef Co., of Tulsa, Okla.

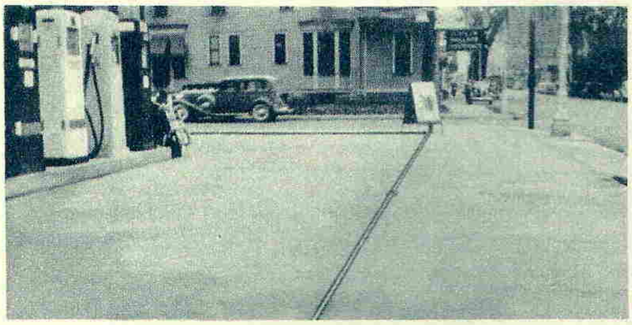
Delivering its products to the retailer at a correct temperature, the company has found the method so successful that deliveries are being made as far as 60 miles from the cold storage room.

Each truck is equipped with a power driven refrigerator unit.

Hose At Gas Station Entrance Announces Customer's Car

A LENGTH of rubber hose laid across the entrance to a gas station in Fort Wayne, Ind., is used to announce the arrival of a car, by means of a buzzer in the station.

Air pressure caused by the car driving over the hose causes a switch to close, which in turn operates the buzzer. With this device, waiting on the part of the customer is minimized, and it is not necessary for the attendant always to be watching for a customer's arrival. The attendant may carry on other duties without slowing service.



Pressure caused by a car passing over a rubber hose causes a switch to close which in turn operates a buzzer at this Fort Wayne, Ind., gas station. Needless waiting of customers thereby is eliminated.

Carleton Ellis— MASTER CHEMIST

Producer of more than 100,000 new products finds time to serve as consultant and write many books about chemistry.

by Aubrey D. McFadyen

Carleton Ellis, whose inventions enter into daily life more than those of any other chemist in history. Though best known for his work in connection with the petroleum industry, his inventions touch nearly every branch of the chemical arts. Soaps, cosmetics, chewing gum, butter, floor wax and dog biscuits are some of the products incorporating improvements worked out by Mr. Ellis.

CARLETON ELLIS is one of the truly great chemists of the age.

He was among the first to crack and refine petroleum to get anti-knock gasoline. He is the man who met Uncle Sam's war-time plea for a fireproof "dope" for airplane wings by extracting it from petroleum, even while Government chemists were saying it could not be done. He is the man who taught the world how to separate out of petroleum all sorts of important chemicals, isopropyl alcohol, for instance, thus bringing to the public for less than $1.00 per gallon a commodity which previously sold for $5.00 a gram. He is the man who revolutionized automobile paints by making a durable coating from tung oil and soy beans. In short, he has made over a thousand inventions—676 already patented, and approximately 400 applications pending before the United States Patent Office.

The inventions of no other chemist in history enter into the daily life of the public in such variety of ways as do these of Carleton Ellis. Though best known for his work in connection with the petroleum industry, paints and varnishes, synthetic resins, and urea plastics, his inventions touch nearly every branch of the chemical arts Soaps, cosmetics, chewing gum, butter, floor wax, the dog biscuit, even the ink of this print, may be mentioned as some of the familiar things incorporating improvements worked out by Carleton Ellis.

Several years ago Mr. Ellis went to Germany armed with letters of introduction to the heads of certain chemical concerns. The first note was received cordially, but incredulously, "What," one of the German scientists was heard to inquire, "is Carleton Ellis doing with letters of introduction? Why, every scientist in the country is already well acquainted with the name." It appears on too many patents on ideas they had ardently wished to claim as their own. Indeed, his fame is world wide. From all corners of the globe come proposals from chemists and chemical students seeking experience in his Montclair, N. J., laboratory. A Japanese chemist once offered to work four years without pay for the simple privilege of learning under Ellis!

Mr. Ellis is not the sort of scientist who keeps his sight focused on a test tube. To the contrary, he is ever looking about the world, into industry and especially agriculture, with an eye to its future needs and resources. Seeing a need, he looks for the right medicine. When he finds the right medicine he administers it back to the world. The uncanny thing about it is that he finds the right medicine—and patents it—long before the industrial chemists come across the idea. Consequently many manufacturers pay Ellis royalties.

A camera received upon his eleventh birthday as a present from his father switched the boyhood ambitions of Carleton Ellis from electricity to chemistry, and started him upon his brilliant career as a research chemist. The wonders of the chemical reactions of photography seemed to ignite the experimental bent of the lad. Every picture he made included some chemical experiment intended to improve photography. When his thrifty New Hampshire parents protested his experiments as wasteful extravagance, young Ellis resorted to exploiting his photographic skill throughout his neighborhood as a means

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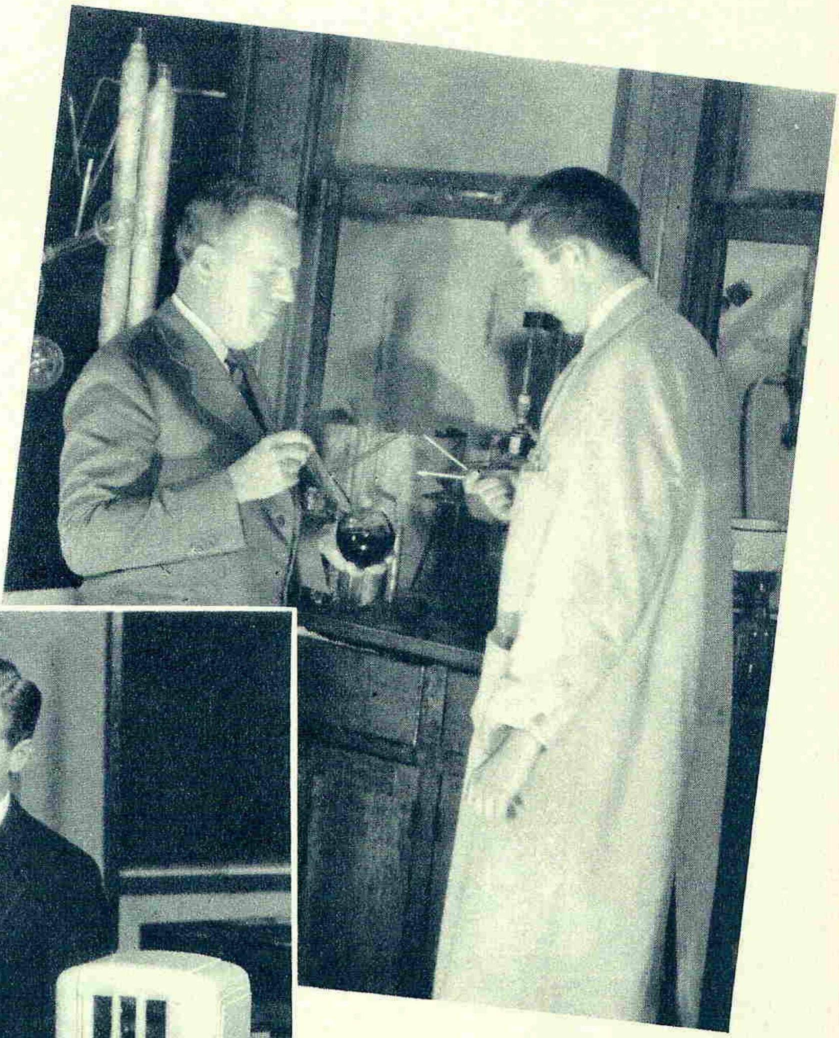
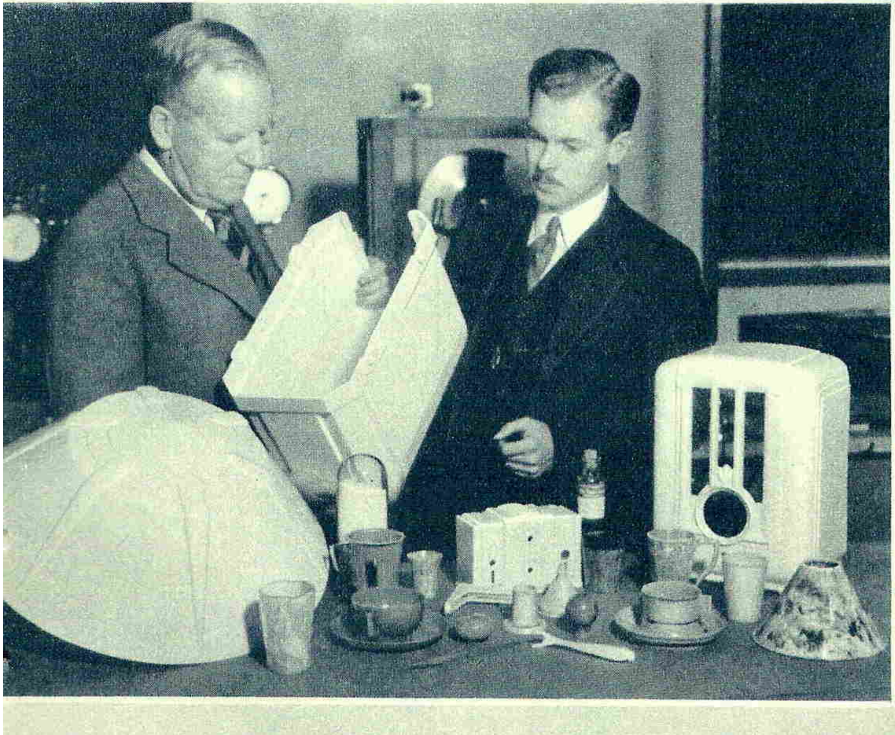




Left—Mr. Ellis (left) and his assistant, Dr. Root, inspect an assortment of articles developed in the Ellis-Foster Laboratories. These articles include such things as lamp shades, radio and clock cases, toilet articles and buttons. Above—Mr. Ellis in the petroleum division of his laboratory discusses progress on Diesel motor fuels with an assistant, Dr. Swaney.

he did it—and wasn't burned

FIRE WALKING . .

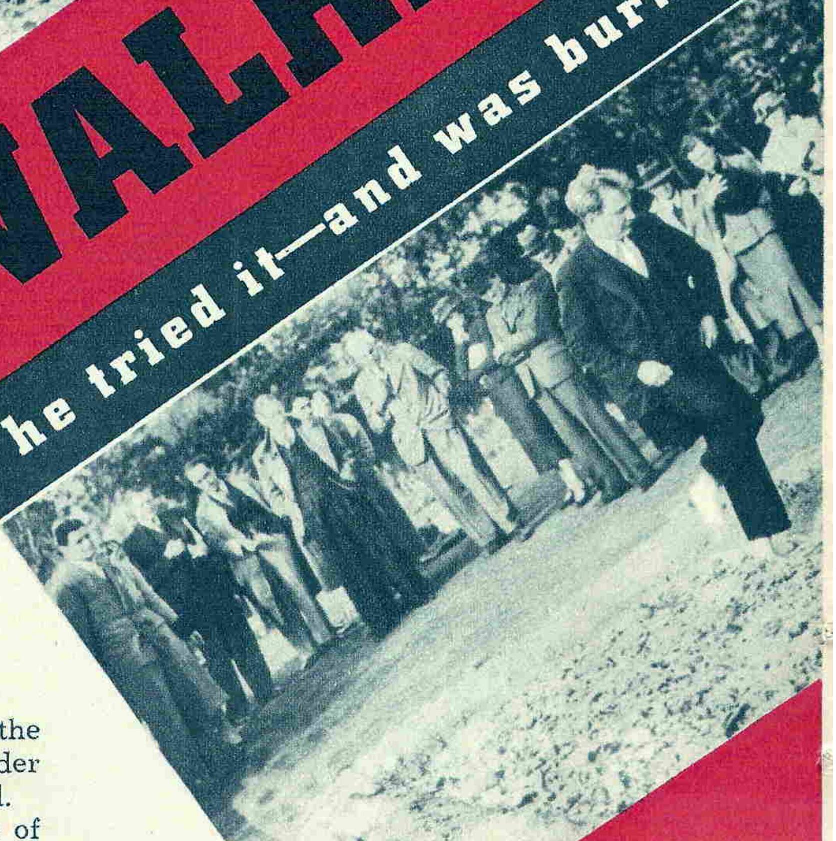
he tried it—and was burned!

Kuda Bux as he walks over the hot stones in a demonstration of faith. He claims that those who are able to walk through fire unharmed do so because of their religious faith.

SCIENTISTS have recently tested the famous "fire walking" ceremony under their own stringent conditions of control.

A young Kashmir Indian by the name of Kuda Bux walked barefooted back and forth across a trench of glowing embers—emerging unharmed from the ordeal.

We have all heard of these fire-walking ceremonies, which have been undertaken by natives in Fiji, Tahiti, Trinidad, Japan, the Straits Settlements and in other parts of the world. And, just as Shadrach, Meshach and



A spectator tries walking through fire immediately after Kuda Bux's demonstration. After taking but few steps, he was forced to leave fire pit. Examination of his feet disclosed severe burns.

Bare feet walk through fire without being burned as science watches and fails to offer a suitable explanation.

FACT or FABLE?

by
Hereward Carrington

Fire Walker Kuda Bux being examined immediately after a "stroll" through fire trench. He showed no sign of having been burned or even scorched.

Abednego emerged from the "fiery furnace," in the Old Testament story, so do these modern fire-walkers seemingly escape burns or injury.

How can such a seemingly impossible feat be accomplished? All the witnesses are agreed that there are no burns upon the feet. What happens? Kuda Bux says "faith" is the answer. His contention is that all those who are able to walk through the fire unharmed do so because of their religious faith.

Sceptics, on the other hand, have asserted that either the fire was not really hot enough to burn, or that the skin of the feet of the participants was calloused or chemically treated in such a manner as to give protection from the flames.

But can this be true? The fire has been tested by means of thermometers, and found exceedingly hot—as we shall see. Also, the feet of the walkers have been examined by medical men, and they have stated that they are not prepared in any way. Natives have walked. Europeans have walked. Cases of injury are rare—and when they have occurred it is usually because the participants did something they had been warned *not* to do!

Let us give one or two illustrative cases of fire walks of this character, which are typical of many.

The first is from Fiji, and is reported by Dr. T. M. Hochen, F. L. S., Dr. Colquhoun, and Mr. Vaughn, of the Meteorological Department of the Island of Suva.

Three days were occupied in the building of the oven and the preparation of the fire, which was lighted from thirty-six to forty hours before the ceremony took place. Stones were pulled over the fire, which in the course of a few hours became white hot. The oven was circular in shape, 25 to 30 feet in diameter and about 8 feet deep. It had slightly sloping sides.

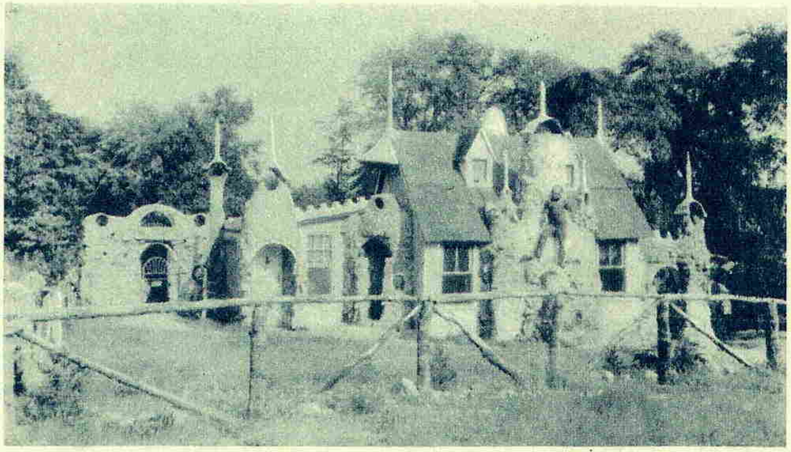
Three photographers were present to take pictures of the firewalk in actual progress. A thermometer was held over the center of the oven, by means of a long pole, about five feet above the surface. It showed a temperature of 252 degrees F. It was

[*Continued on page* 133]

An Indian fakir entertaining a crowd in Delhi, India, by treading on a bed of live coals, which is one of the most spectacular and unexplainable feats of these mystic performers.

A group demonstration of faith. Although the youngster does not appear to be enjoying the experience, it is claimed that when a person does not have sufficient faith to walk through the fire alone, many times it is possible to acquire immunity by holding the hand of one more versed in the art. Tests of fires used show the inside temperatures to be as high as 2,552 degrees F. (hot enough to melt steel), while surface temperature of 800 degrees are not uncommon.

Swamp Furnishes All Material For Unique House



A "depression palace" was constructed from the material found in a swamp by George Daynor, shown standing on the chimney structure. Arch doorways are shaped like giant keyholes, fenders of old cars supporting the masonry.

WHEN George Daynor, ex-prospector from Alaska, found himself with but $4 as his total capital, and in the country near Vineland, N. J., he spent those last dollars to buy four acres of swamp land that was being used as a dumping place for discarded automobiles. From this desolate, mosquito infested land, Mr. Daynor has built a dwelling such as is seen only in fairy tales.

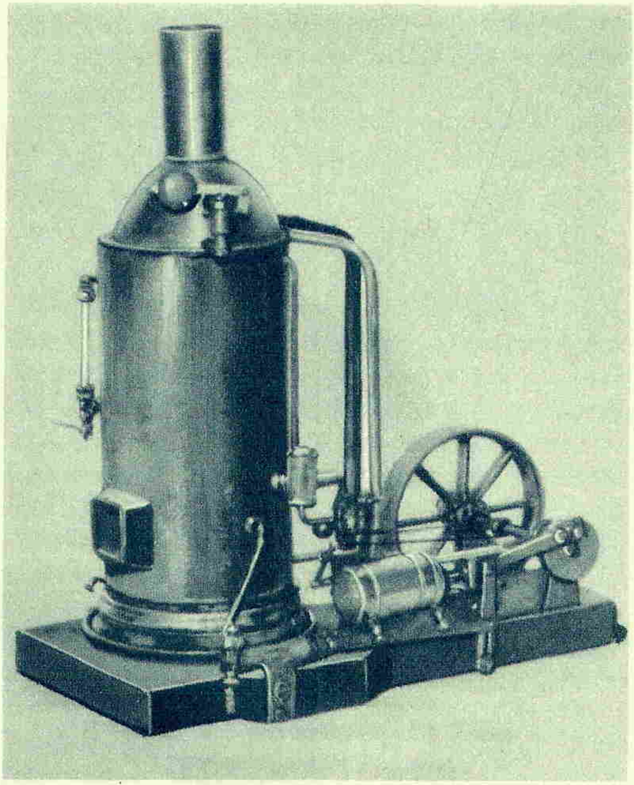
Working alone, and with few tools, he felled lumber and collected stones in his woods, dug clay in his swamp and tore apart the rusting motor cars to obtain their structural steel.

Using the clay as mortar for outside masonry and plaster for the inside walls, and heavy timber or steel from the cars for roof beams and columns, he erected a house both grotesque in design and sturdy in construction.

Arch doorways are shaped like giant keyholes, the fenders of old cars supporting the masonry. Numerous tall spires made from car rods covered with clay, rise above the roof like a forest of lances.

Inside, the clay walls are tinted with powder from crushed brick and stone.

Scrap Metal Becomes Engine



A model of a logging donkey engine has been constructed from scrap metal by Sydney Woods of Vancouver, B. C. Using wood as fuel, this foot high model operates realistically.

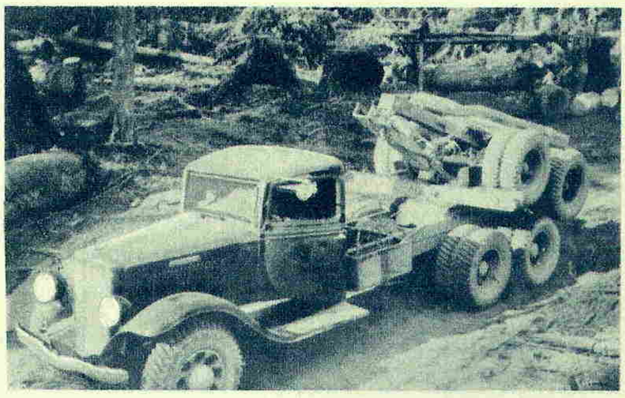
A WORKING model of a logging donkey engine was constructed of scrap metal by Sydney Woods of Vancouver, B. C. Tin cans, odd pieces of metal and old lead went into the construction of this foot-high model.

Truck Carries Own Trailer

A TRAILER truck which folds up when not carrying a load, is being used in the west for logging purposes.

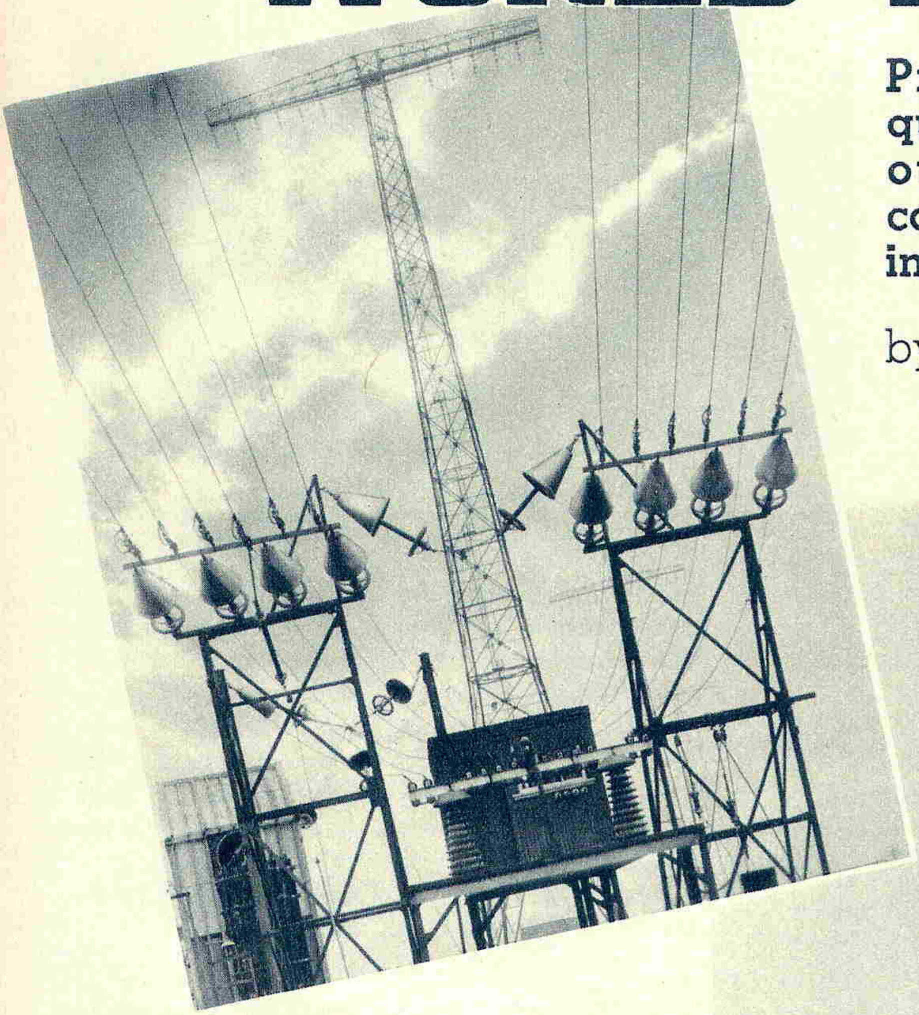
Controls operated by the driver in the cab, causes the rear section to be drawn up on the truck, thereby giving greater safety when operated on the highways.

It may be unfolded and made ready for receiving a load within a few seconds.



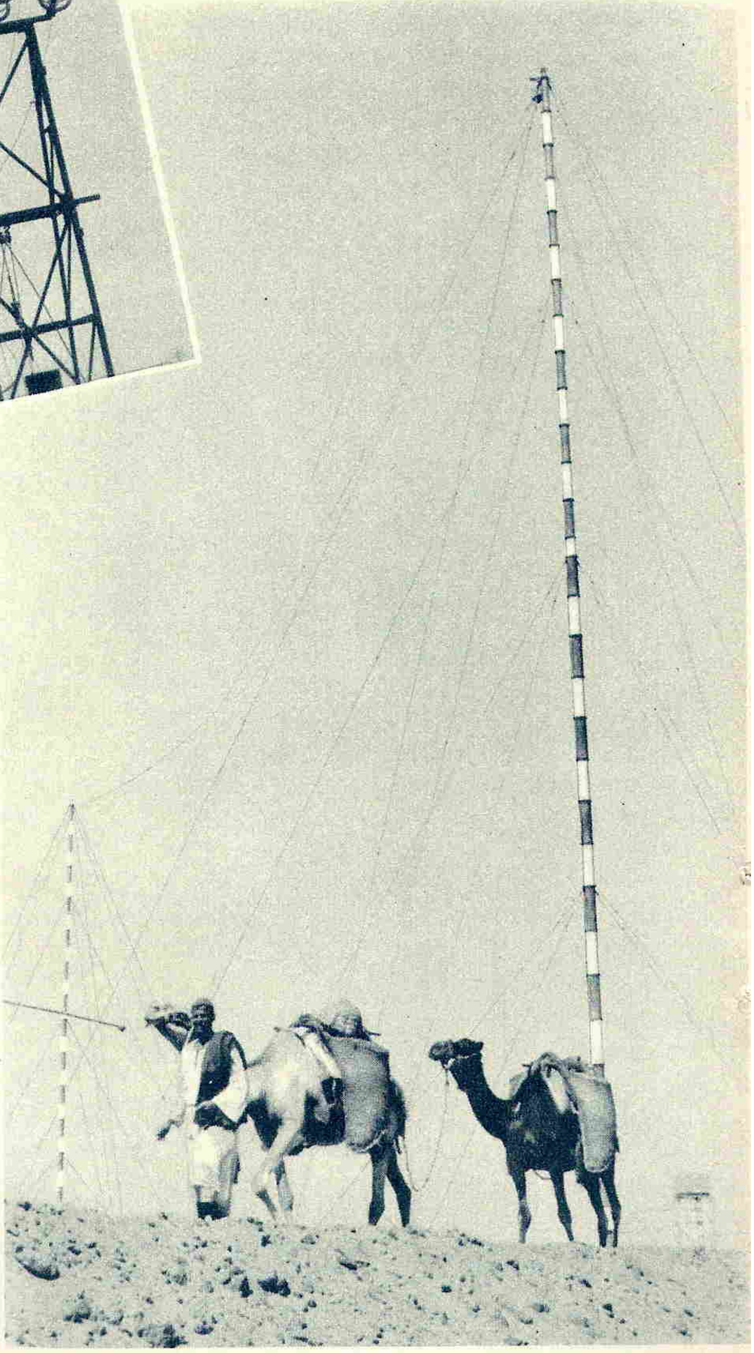
As an aid to highway safety, this trailer truck was developed for western logging purposes. When not loaded, rear portion is carried by the truck. Machine is equipped with air brakes.

WORLD RADIO



Priceless radio frequencies will be doled out at international conference to be held in Cairo early in 1938.

by Roland C. Davies



Above—Looking up at the giant radio towers located at R. C. A.'s "Radio Center," Rocky Point, L. I. These towers support the antenna for the largest radio station in the world. At right, in marked contrast, is the antenna system for an Egyptian Government station near Cairo.

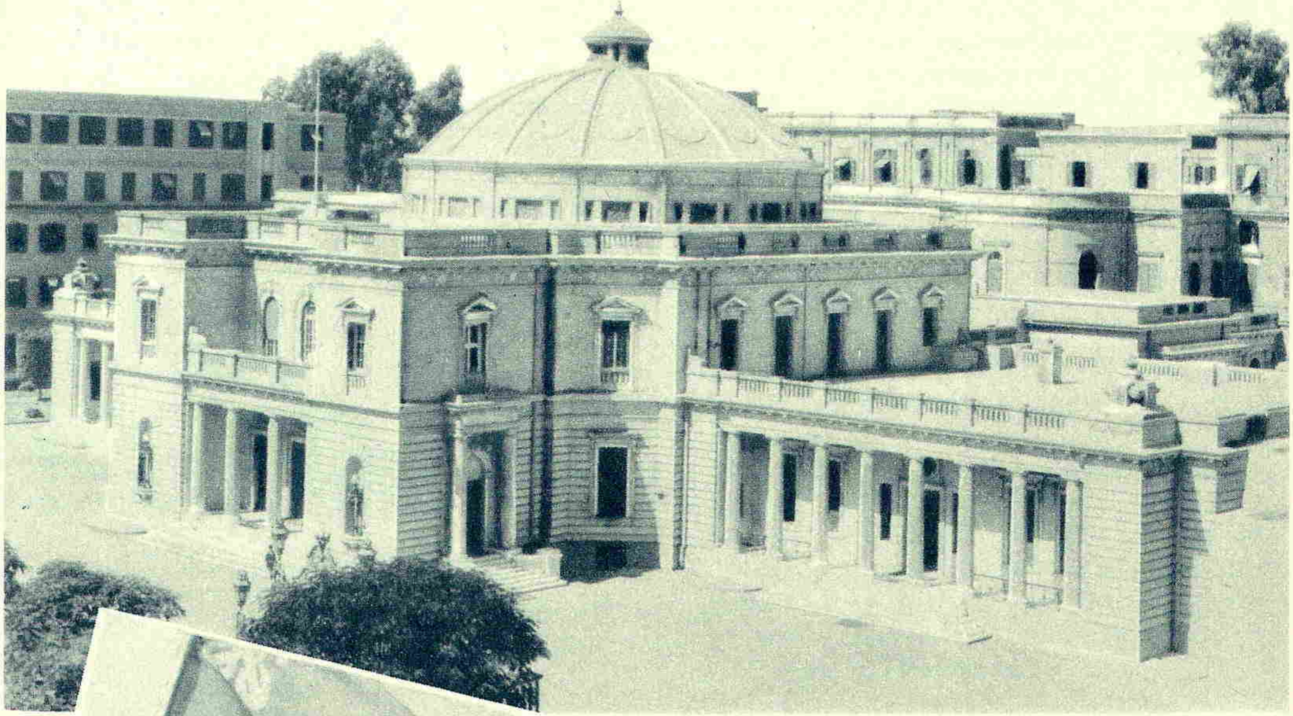
AS THE smoke of foreign conflict rises above the horizon, students of world affairs realize that international broadcasting is perhaps the most potent arm of propaganda to dump nations into the inferno of war or to maintain peace.

Almost daily the press tells how foreign nations are using that marvel of modern science to tell the world via short-wave radio of their nationalistic aims, armed strength and economic prestige.

Within the next few months, the doling out of the coveted radio frequencies on a world-wide scale will be taken up by two international parleys, with the allocations of ether channels to international broadcasting as the outstanding and most controversial problem.

First is the biennial meeting of the International Radio Consulting Committee, com-

BATTLE LOOMS



Above—Parliament Building in Cairo, where the Third International Radio Conference will be held in February, 1938. World diplomats will gather here to allocate the much-coveted radio frequency spectrum.

King Farouk, boy ruler of Egypt, who may open the conference when it convenes early next year. The American delegation probably will be assisted by leading radio authorities as unofficial advisors.

monly termed the CCIR, at Bucharest, Rumania, in the Spring of 1937. Then will come the Third International Radio Conference, which meets every five years, to be held in February, 1938, at Cairo, Egypt.

The Cairo conference will capture the eyes of the entire radio world, because it has treaty-making powers in drawing up the rules that govern frequency allocations, interference and use of radio. The findings of the CCIR at Bucharest, however, are purely advisory and are confined to technical problems. They carry the weight of a world consensus for the guidance of the treaty-making assembly at the Egyptian capital in 1938.

During the last six months a score of American government radio experts, aided by the leading technical brains of the nation's broadcasting and communications companies, have been busy drafting the United States proposals to be presented at the Cairo conference. The American program is to be forwarded by this coming November to the other nations, which in turn send their proposals to the United States so that all may study in advance the plans that will come before the international conference.

There is a saying in world capitals that the United States has not only never been defeated in a war but also has never lost an international radio conference, although this nation may have been the victim of shrewd diplomats in recent arms and economic parleys. Back in 1927, when the nations first assembled in Washington for a world radio agreement, the United States took the leading role. At that time the use of radio by ships was the principal international problem, with broadcasting limited chiefly to national boundaries. At Madrid in 1932, broadcasting became the critical problem, but the squabbles were confined in a large degree to European nations.

However, the Cairo Radio Conference is expected to become the scene of a bitter fight. The larger European powers—England, France, Germany, Italy and Soviet Russia—together with Japan, are to be pitted against the smaller countries, while the United States will hold the balance of power. The short waves for international broadcasting will be the issue at stake. In the past the larger nations, due to greater technical progress, have grabbed the better allocations for broadcasting and

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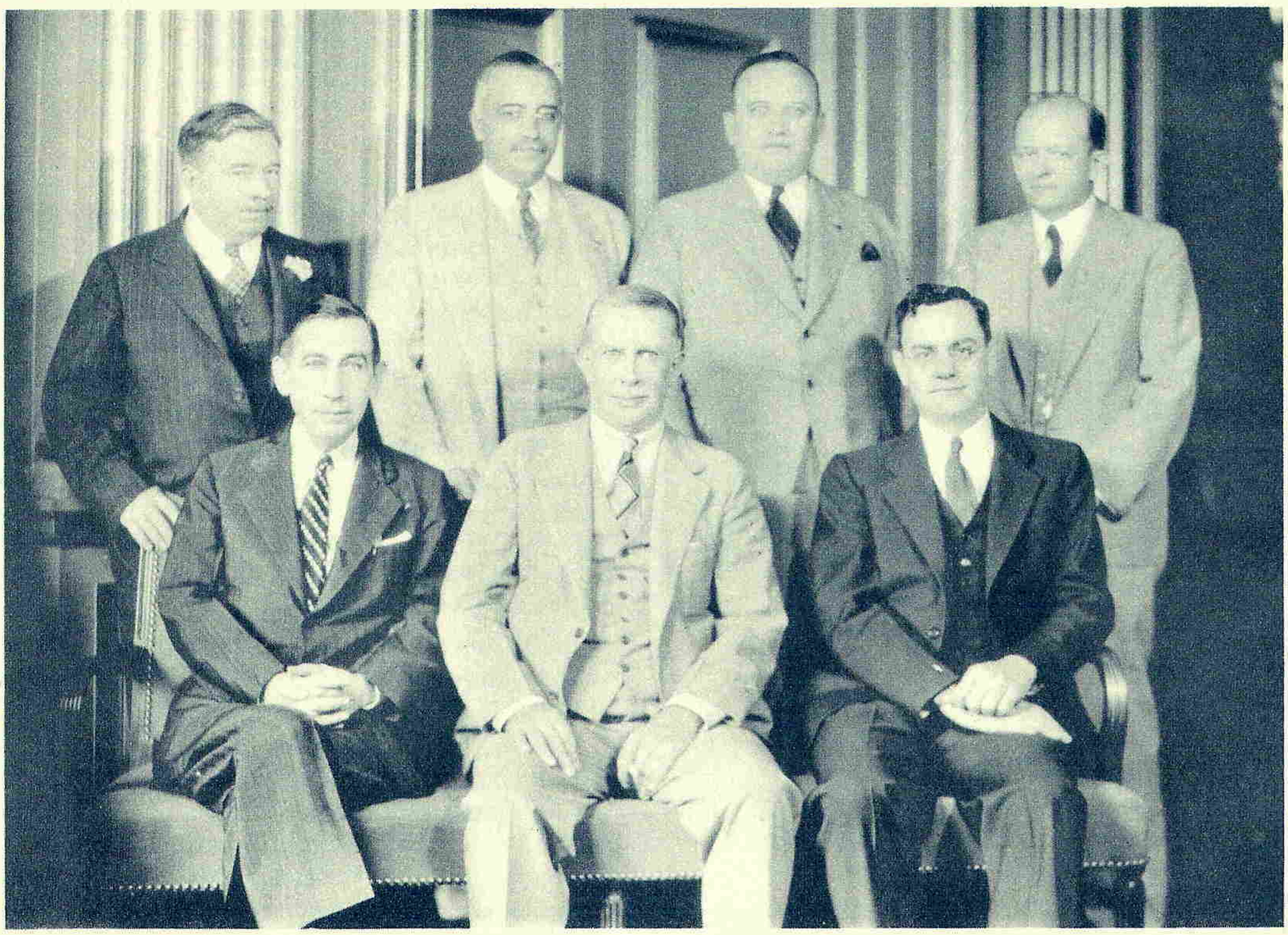
Gerald C. Gross, engineer of the Federal Communications Commission, who has participated in most of the international radio conferences.



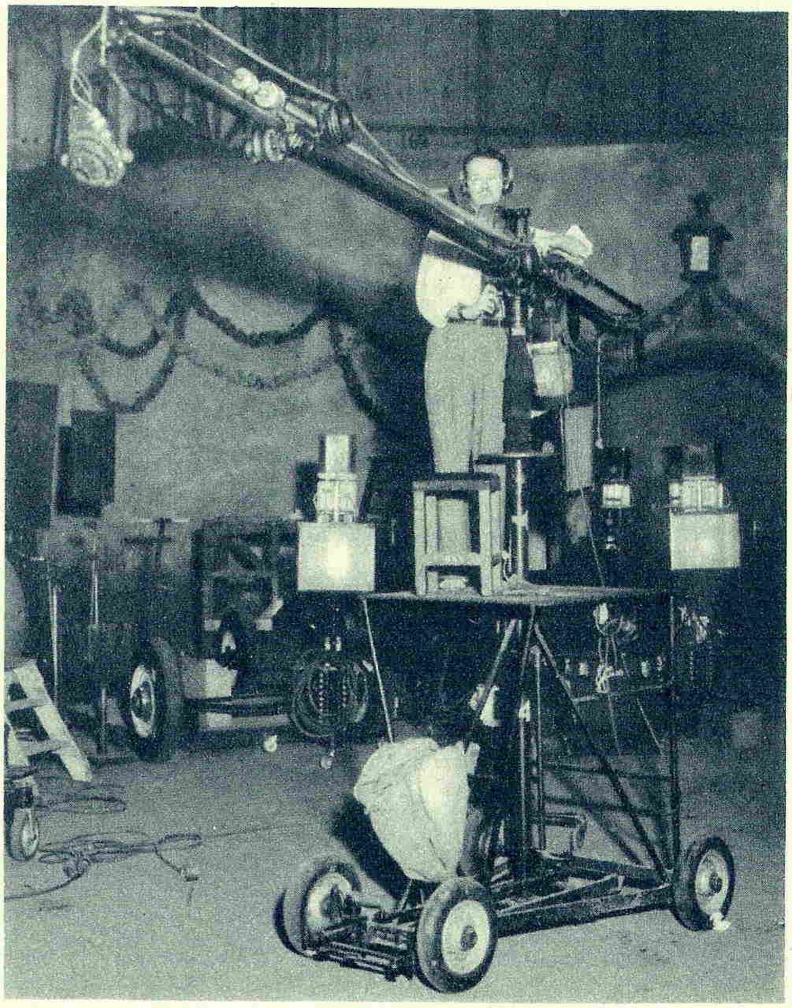
The Federal Communications Commission, which will have charge of preparing the United States position at the Cairo Conference. Left to right, front row, E. O. Sykes, Broadcast Division chairman; Anning S. Prall, Communications Commission chairman; Irwin Stewart, Telegraph Division chairman. Back row, left to right: George H. Payne, Norman S. Case, Thad H. Brown and Paul A. Walker.

Mobile Microphone Boom Aids Voice Pickup

A SPECIAL long boom and microphone now are being used by the motion picture studios to pick out the conversational lines of any actor being filmed.

Even though it is used on a large setting, the boom, having a 25-foot radius, is ample for picking out the desired dialogue and controlling the sound effect by selecting what is to be recorded.

The unit rests on rubber tires for silencing, and may be pushed about during filming, while the sound man controls the movement of the boom to follow the movements of the actors.



A mobile microphone boom having a 25-foot radius makes it possible to pick out conversational lines of any actor during filming. The unit rests on rubber tires and may be pushed about while sound man operates boom arm.

Concrete Weight Cut

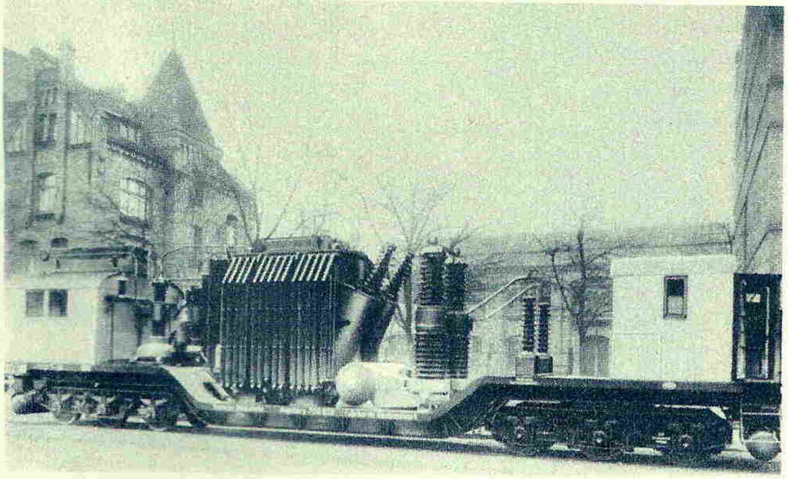
A NEW road surface containing a material light enough to float in water is making a marked reduction in highway surface weight.

Used in the concrete slab on the San Francisco Bay Bridge, a 30,000,000-pound weight reduction was noted.

Called Gravelite, the substance effects the weight reduction because it weighs but half as much as the sand and gravel it replaces.

It is made by burning clay and shale in such a manner as to cause them to expand into a light weight material having unusual strength qualities.

Transportable Transformer Fills Emergency Need

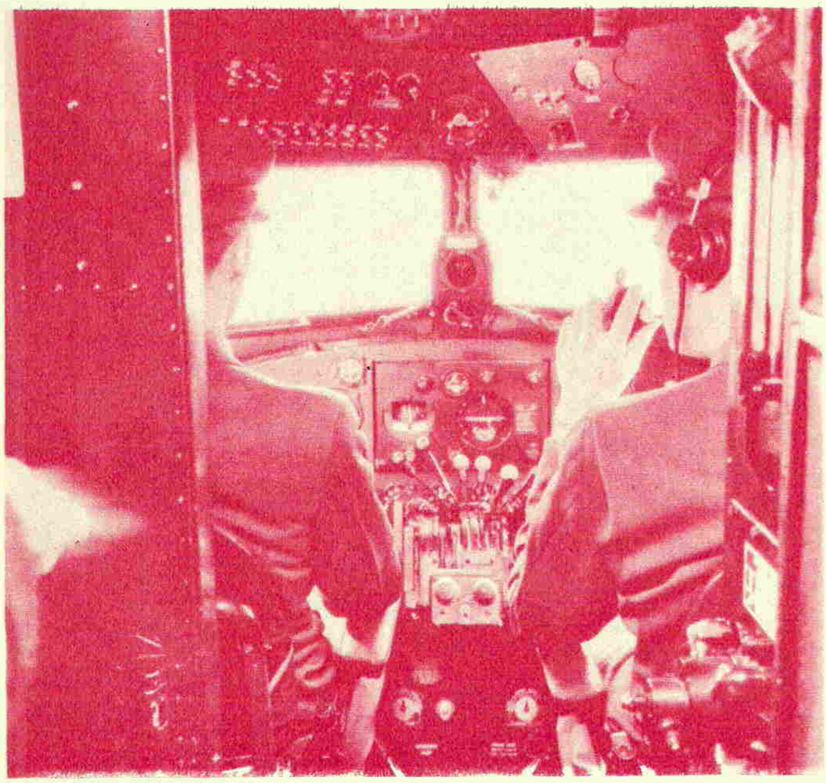


This portable transformer, used in Germany, may be moved rapidly to replace a stationary unit out of service, thereby reducing the service interruption to a minimum. Special car was constructed by the German State Railway.

A PORTABLE transformer attached to a railroad flat car has been constructed by the German State Railway. For use during emergencies, the transformer will be used for temporary replacement of defective transformers.

Because installation of units of large size sometimes entail a considerable transportation problem, this unit, permanently fixed to the special railway car, may be sped to the scene of an emergency and service may be continued with a minimum of interruption to the consumer.

Improved Gyropilots Adopted By Aircraft Operators



The rectangular section of the instrument panel visible between the two pilots of a United Air Lines "Mainliner" represents the installation of the latest type Gyropilot device which helps maintain level flight despite rough air.

GYROPILOT devices, the "automatic humans" that actually pilot giant airplanes, have proved to be so efficient that installations in commercial and private aircraft have increased from a single device to more than 400 within three years. The latest type weighs only 60 pounds and its action is based on pneumatic and hydraulic principles, having no clutches, motors, or electric contacts.

The improved devices detect the slightest change in an aircraft's course or flying position and instantly apply corrective movements to the controls. Thus, in rough air the plane is not subjected to the larger angular displacements resulting from delayed manual control, insuring smoother flights.

Circuit Improves Radio

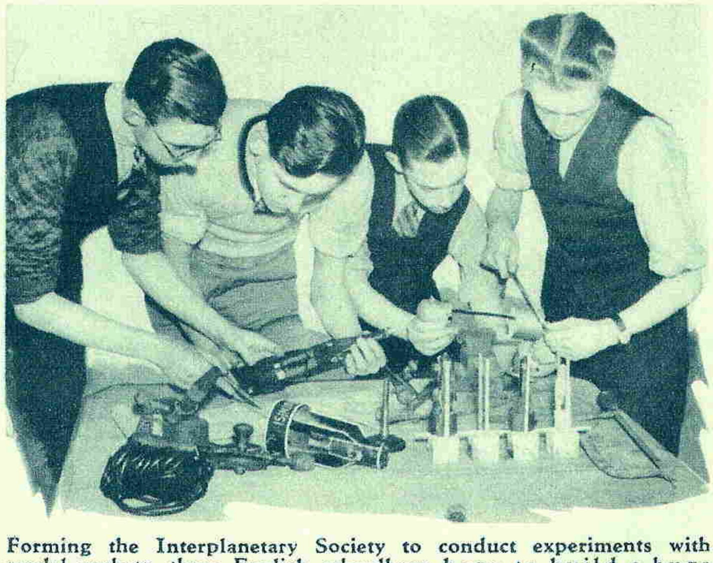
AN INGENIOUS circuit intended to eliminate the detuning of a ship's radio transmitter and receiver caused by rolling seas has been patented at Washington, D. C., by Jean Rebotier, of Paris, France.

When a ship rolls at sea its radio antenna tilts toward and away from the water. This causes a change in antenna capacity which may throw the receiver out of tune and the transmitter out of control so that the radio signals received or sent out may vary in intensity or be totally lost.

To compensate for this trouble, the inventor connects the antenna with a variable tuning element, an adjustable condenser, which is worked automatically by the rolling motion of the ship. No matter what position the ship is in, its antenna capacity remains constant. Signals sent and received, therefore, cannot vary with the rolling of the vessel, but remain constant.

Schoolboys Build Model Rockets

EXPERIMENTING with model rockets in the hope that their research will someday enable them to construct a huge rocket which will travel to the planet Mars, a group of 14 schoolboys in Manchester, England, have organized the Interplanetary Society. The members attend weekly meetings at which each boy takes an active part in constructing the model rockets used in experiments.



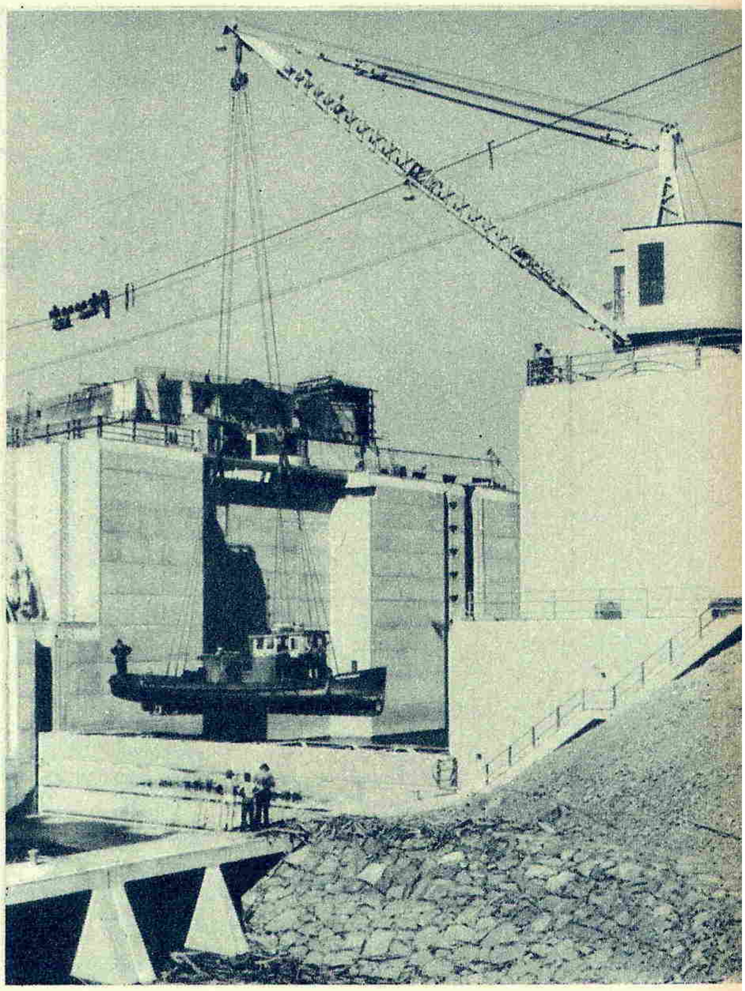
Forming the Interplanetary Society to conduct experiments with model rockets, these English schoolboys hope to build a huge rocket that will travel to Mars or some other distant planet.

Crane Serves As Temporary Ship Lock

A GIANT crane has been pressed into service as a novel ship lock at the Bonneville Dam project on the Columbia River in Oregon. Tugs and other small craft navigating the river are lifted over a bulkhead pending completion of the dam's permanent water lock which will permit passage of ocean going vessels and other river craft.

The Bonneville Dam is located 40 miles above Portland, Oregon, and the entire Pacific Northwest will benefit from the power, navigation, flood and irrigation facilities which it will provide when completed. The waters of the Columbia River will be confined behind the 1,250-foot dam, creating a 100,000-acre reservoir.

Engineers of the War Department are constructing the dam under an initial allotment of over 32 million dollars from the Public Works Administration.

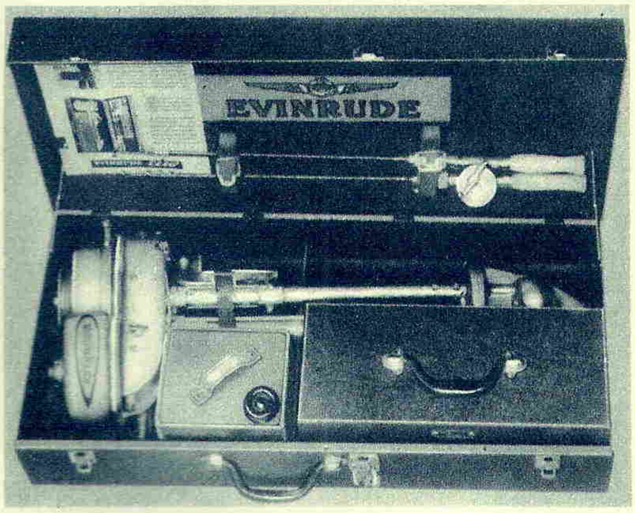


Pressed into service as a temporary ship lock, this giant crane hoists tugs and other small craft to higher water levels of the Columbia River at the Bonneville Dam project in Oregon.

Angler's Kit Carries Motor

DESIGNED especially to provide fishermen with a convenient way of transporting a small outboard motor and fishing tackle while enroute to a distant lake or stream, a compact metal carrying kit has been developed by a leading manufacturer. Completely loaded, the kit weighs less than 30 pounds and is carried like a suitcase.

The cover of the kit provides room for three casting rods, while the kit proper provides space for a small outboard engine, a one-gallon fuel can, a 17-inch tackle box, three or four reels and a tube of grease.



Waterproof in construction, this compact fisherman's kit provides ample storage space for a small outboard motor, tackle box, one-gallon fuel can, and three fishing rods.

U. S.-Soviet Air Line Planned

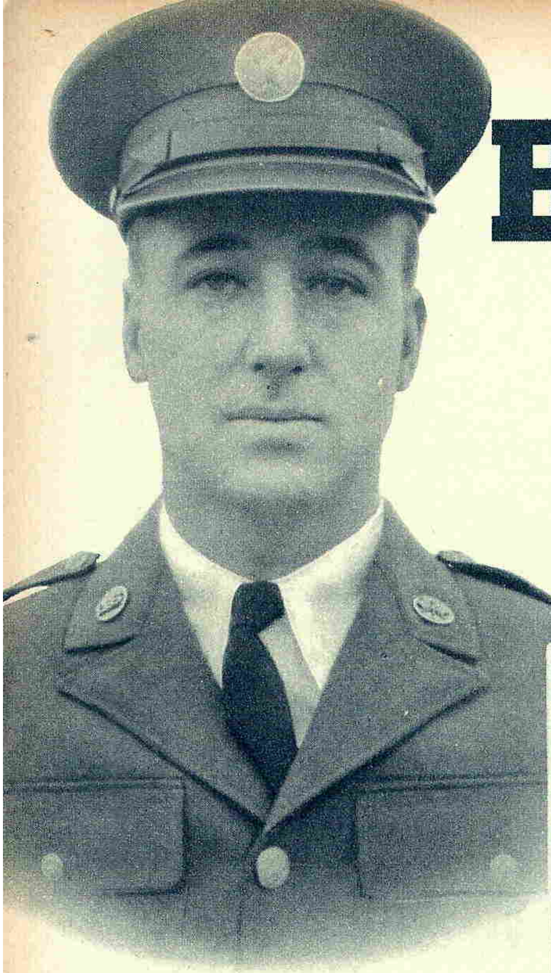
A NEW and direct international air route between Moscow, capital of the Soviet Union, and U. S. territory, is being discussed in Moscow. The route, as planned, would provide air communication between the two nations without the need of traversing the frontiers of Europe or other foreign countries.

The proposed route would be 10,000 miles long, running from Moscow to Nome, Alaska, and then to Seattle, Wash., via Fairbanks and Juneau, Alaska. With good airports and modern high-speed airplanes, it is estimated the route could be covered in four to five days.

Several Soviet aviators have already pioneered part of the route, crossing the subarctic regions of Siberia. An agreement between the U. S. and Soviet governments is needed before the route can be projected further.

BLACK GOLD

Lone soldier of U. S. Army's farthest-flung outpost invents method of converting Alaska's useless surface oil to crude oil.



Master-Sergeant Stanley R. Morgan, Signal Corps, U. S. Army, inventor of the process that may make Alaska a new source of wealth.

Above—Time honored method of transportation in the Arctic. This photo was taken near Barrow. This is in sharp contrast to the newer method developed by Sergeant Morgan.

Right—Huskies look at their new rival, the snowmobile. Front end rides on skiis to make steering possible over the snow. Sergeant Morgan takes long trips in this machine.

TOWARD America's last frontier the march of empire drives, and a day may come when the white and mysterious Arctic Coast will be transmuted—through the twin alchemy of black and yellow gold—into a thriving pioneer country, a new Eldorado.

This is the dream, a dream fast taking shape and substance, of Master Sergeant Stanley R. Morgan, lone soldier of the United States Army's farthest-flung outpost, who possibly knows more secrets of the Land of the Midnight Sun than any other white man alive.

Sergeant Morgan, Uncle Sam's Law North of 68, brought the bodies of Wiley Post and Will Rogers out of the wreck of their Siberia-bound plane near Point Barrow, and at once skyrocketed into world fame when he wirelessed from the top of the world the news of an American tragedy—the death of heroes.

As a result of his part in that drama of the Polar No-Man's-Land, he was promoted by the War Department to the highest enlisted grade, and granted an extended furlough to visit "the States" and receive high honors from Washington officialdom.

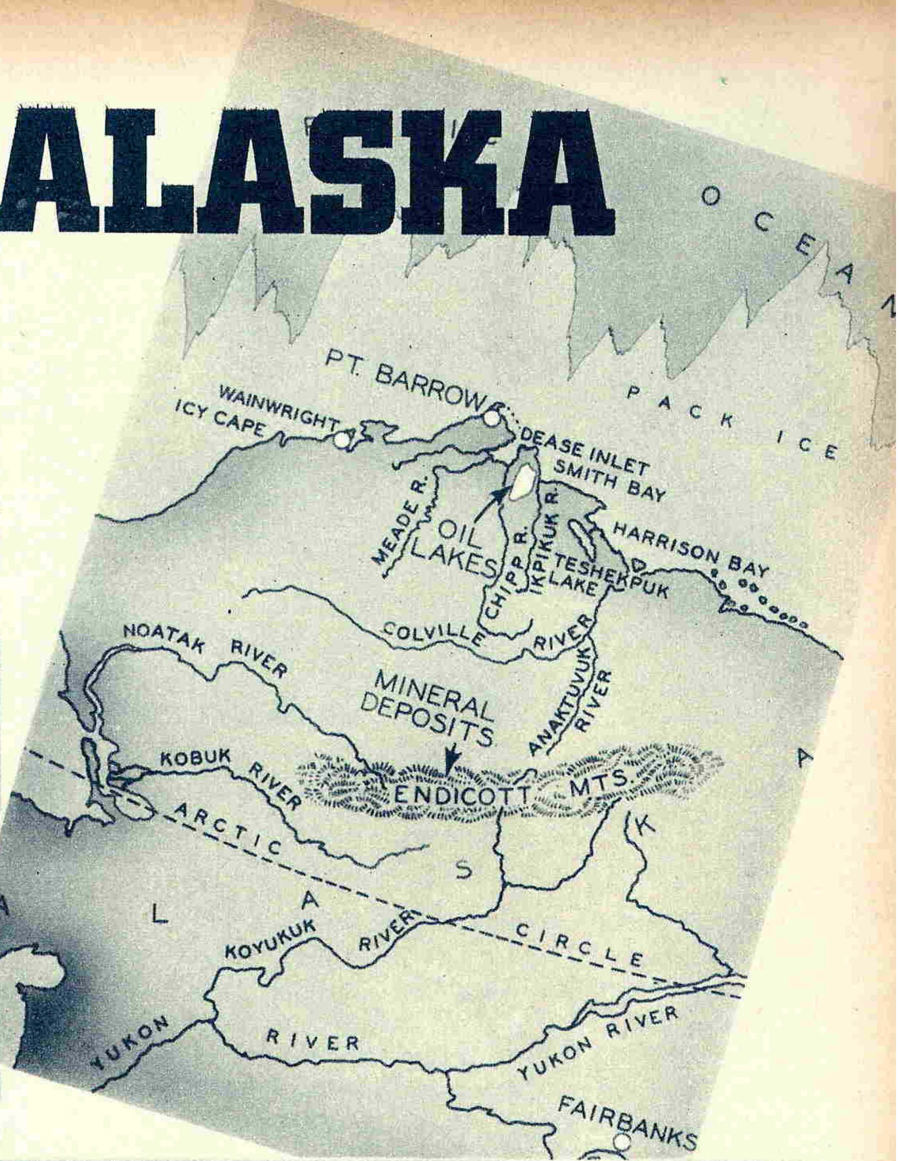
The furlough he found a mixed blessing. On one hand, he soon became homesick for the white solitude of Point Barrow, but, on the other, his presence in civilization served the needs which are his leading motives; development of the Arctic Coast and practical help for the Eskimos.

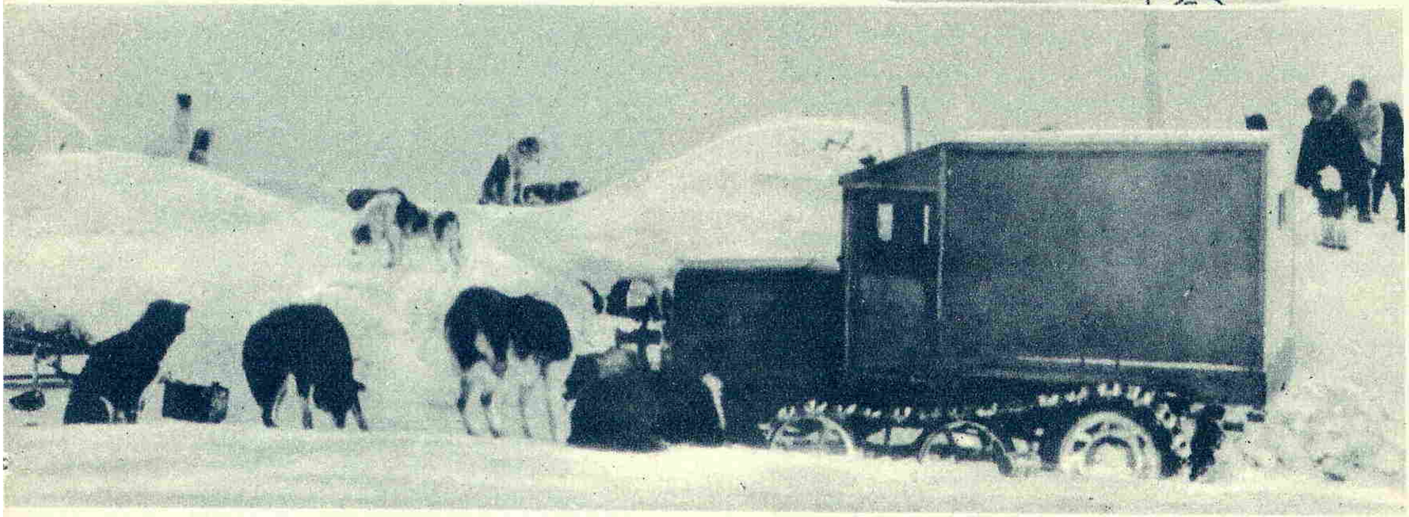
Morgan's Alaska is not the Alaska of timber and mountain torrents. It is a flat and silent stretch of coastline a thousand miles long, without a tree or a bush anywhere. It is like a spectral prairie on a dead planet, facing for eternity toward the mute snow wilderness of

FROM ALASKA

by
Paul Conant

Right—Map showing area surrounding Pt. Barrow, and the location of the oil lakes.


OCEAN
PACK ICE
PT. BARROW
WAINWRIGHT
ICY CAPE
DEASE INLET
SMITH BAY
MEADE R.
OIL LAKES
CHIPP R.
IKPIKUK R.
HARRISON BAY
TESHEKPUK LAKE
COLVILLE RIVER
NOATAK RIVER
MINERAL DEPOSITS
ANAKTUVUK RIVER
KOBUK RIVER
ENDICOTT MTS.
ARCTIC CIRCLE
ALASKA
KOYUKUK RIVER
YUKON RIVER
FAIRBANKS



the North Pole, a prison land guarded the whole year 'round by the grinding Arctic ice pack. And yet—here are natives who need the things that make even primitive life endurable, and here are glittering treasures which have always delighted white men.

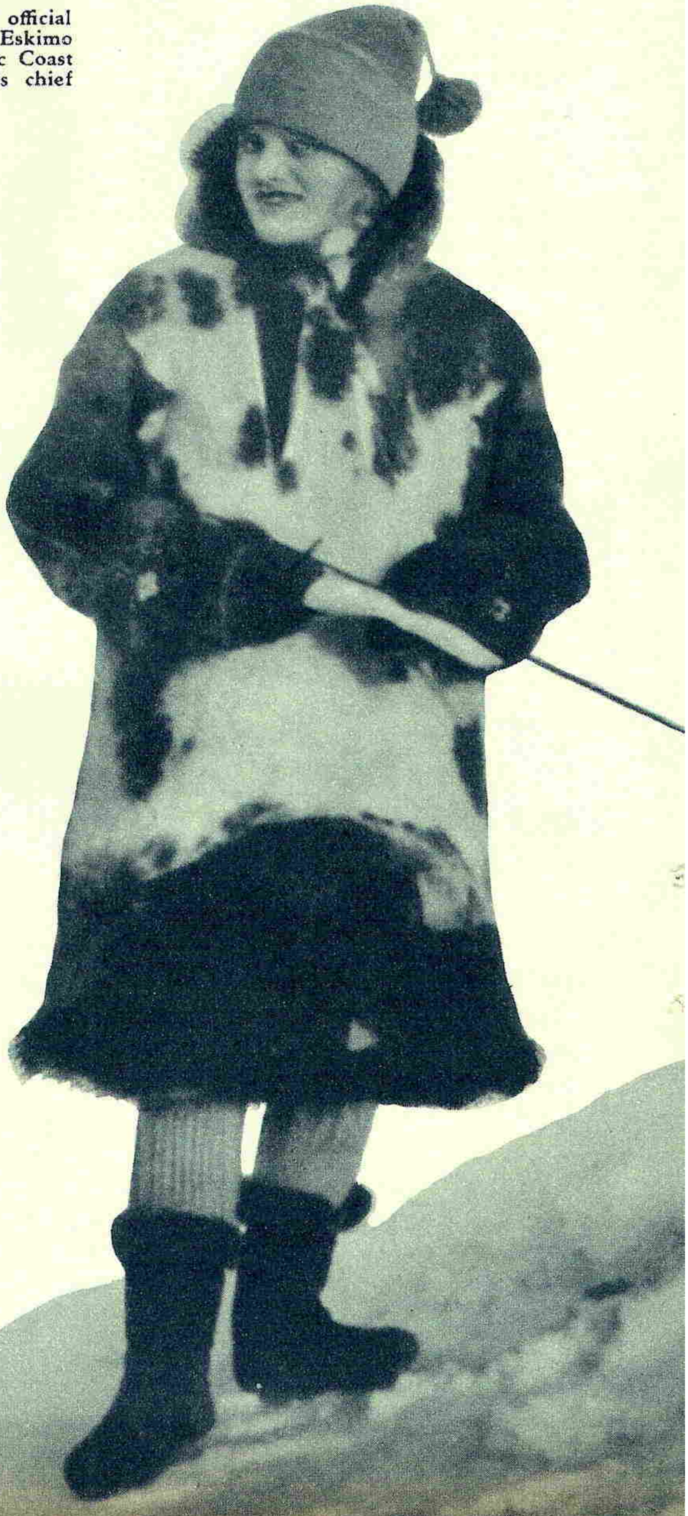
To bring the natives the things they want, and to open the Northland's ice-locked treasury to the whites—these are the problems that Sergeant Morgan believes he is solving. But how?

Sergeant Morgan, working in the laboratory of the Eighth Signal Service Company in Seattle, waiting for the summer breakup of the Arctic ice pack that will allow him and his family to go "home" to the top of the world, tells about himself and his dreams.

"There are two things," he says, "that the Arctic Coast needs more than all others. They are things you take for granted here in the States: transportation and fuel.

"You know, the whites up there—and there

Right—Mrs. Morgan, wife of Sergeant Morgan, and official weather observer at Pt. Barrow. Above—A group of Eskimo boys. Sergeant Morgan says that Eskimos of the Arctic Coast are the most unspoiled of any primitive people. His chief official duty is that of performing marriages.



are only twenty-five of us on the whole Arctic Coast—have to import coal, which costs around $45 a ton. The natives, well, they have always used whale oil and they still use it. But the whales are disappearing.

"As the whales disappear, the natives will disappear, too. They'll move to other hunting grounds and they'll die out."

This poverty of fuel hurts Eskimos and white men alike. For the Eskimos, it spells tribal death. For the whites, it closes to them a land of dazzling promise, of immeasurable potentialities. Faced by the grim hostility of this far Never-Never-Land, most men would have given up the whole problem as a bad job. But not Sergeant Morgan, who has in his blood the vital resourcefulness of the American soldier and the American pioneer.

One day, many years ago, when he had first come to Point Barrow to establish a Signal Corps radio and weather station on the farthest north tip of the continent, he was exploring the country fifty miles southeast of his new post of duty. It was then that he discovered for himself a strange manifestation of nature that may be a key to the icy treasure vaults of the Arctic.

"Suddenly," he says, "I came upon a dark lake in the snow. At first I didn't know quite what it was. It seemed rather weird and mysterious and impossible. Investigating, I found that it was oil—heavy, gummy surface oil—a whole lake of it! It proved to be five miles across, and later I found three other

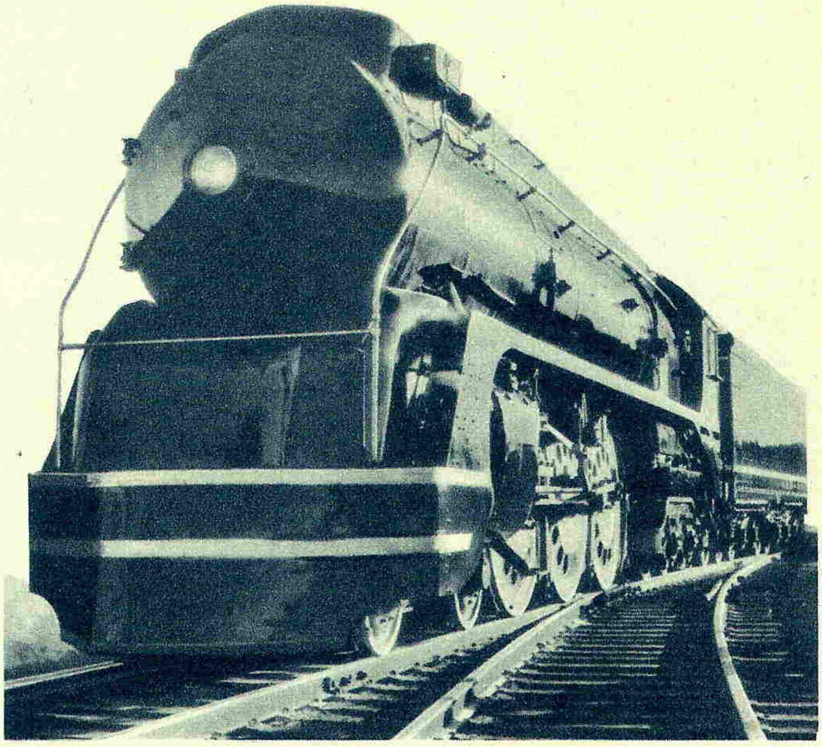
[*Continued on page* 140]

Streamlined Engine Hauls 15 Cars At 80 M.P.H.

DESIGNED to haul a 15-car train at a maximum speed of 80 m.p.h., the first of a fleet of ten streamlined steam locomotives has been placed in service by the N. Y., New Haven & Hartford Railroad. The huge engine is 97 feet long, including a 16-foot tender that carries 16 tons of coal and 18,000 gallons of water, enough fuel for a non-stop run between New Haven, Conn., and Boston, Mass.

The boiler of the locomotive carries a maximum steam pressure of 300 pounds, with a working pressure of 285 pounds, providing initial tractive effort of 44,000 pounds. Completely equipped to run, the engine and tender weigh 694,500 pounds.

The tractive equipment consists of four small wheels under the leading truck, six 80-inch disc driving wheels, and four trailing truck wheels. The engine frame is a 50,000-pound one-piece steel casting, eliminating over 250 bolts and rivets formerly used in engine construction.

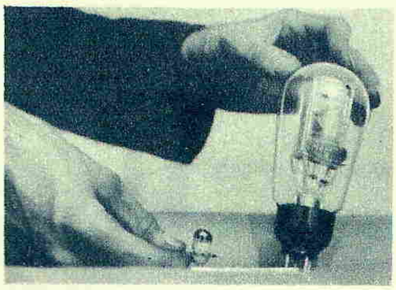


Equipped with automatic stokers and powerful enough to haul 15 passenger cars at 80 m.p.h., this 97-foot steam locomotive is the first to be specially designed as a "streamliner."

Micro-Wave Tube Produced

SIMILAR in size and shape to the seed of an oak tree from which it derives its name, a midget "Acorn" radio tube has been produced by a leading manufacturer. Intended for micro-wave work, the novel tube is robust in construction and although designed primarily for use on one-meter wave lengths, it is said to be equally efficient on ordinary wavebands. Radios as small as an average cigarette case may soon be possible as a result of the development and perfection of the new midget tube, considered one of the world's smallest.

At present it costs $12.50 to produce one of the tubes, despite their tiny size. As in other fields, increased production in the future should lower the cost materially and make the tubes more available to experimenters.

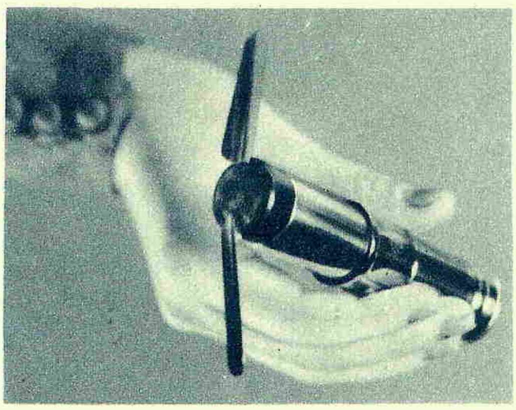


The micro-wave radio tube shown above is dwarfed when placed beside an ordinary tube for comparison.

Electric Fan Fits Purse

OPERATING on two small pen-type batteries, a novel electric fan has been developed by a New York City manufacturer. Small enough to fit into a lady's purse when not in use, the tiny fan is specially designed for use at the theater, being noiseless.

The fan blades do not revolve fast or hard enough to injure the fingers should they accidentally contact them while whirling, yet they provide an ample, steady breeze. Battery refills are available.

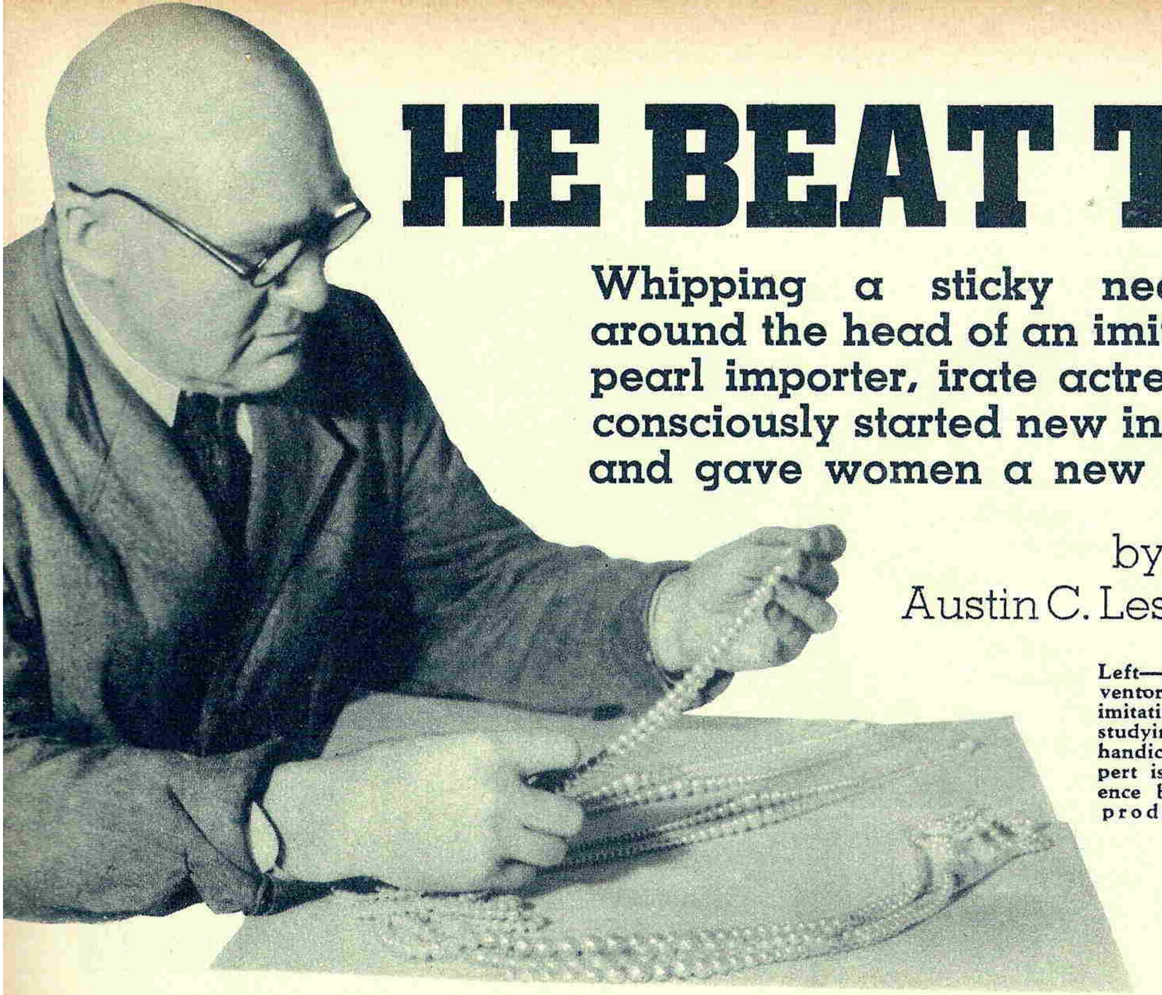


Two batteries in a compact metal holder supply the power for operating this novel fan designed for use at theater or opera, being noiseless.

HE BEAT The

Whipping a sticky necklace around the head of an imitation-pearl importer, irate actress unconsciously started new industry and gave women a new jewel.

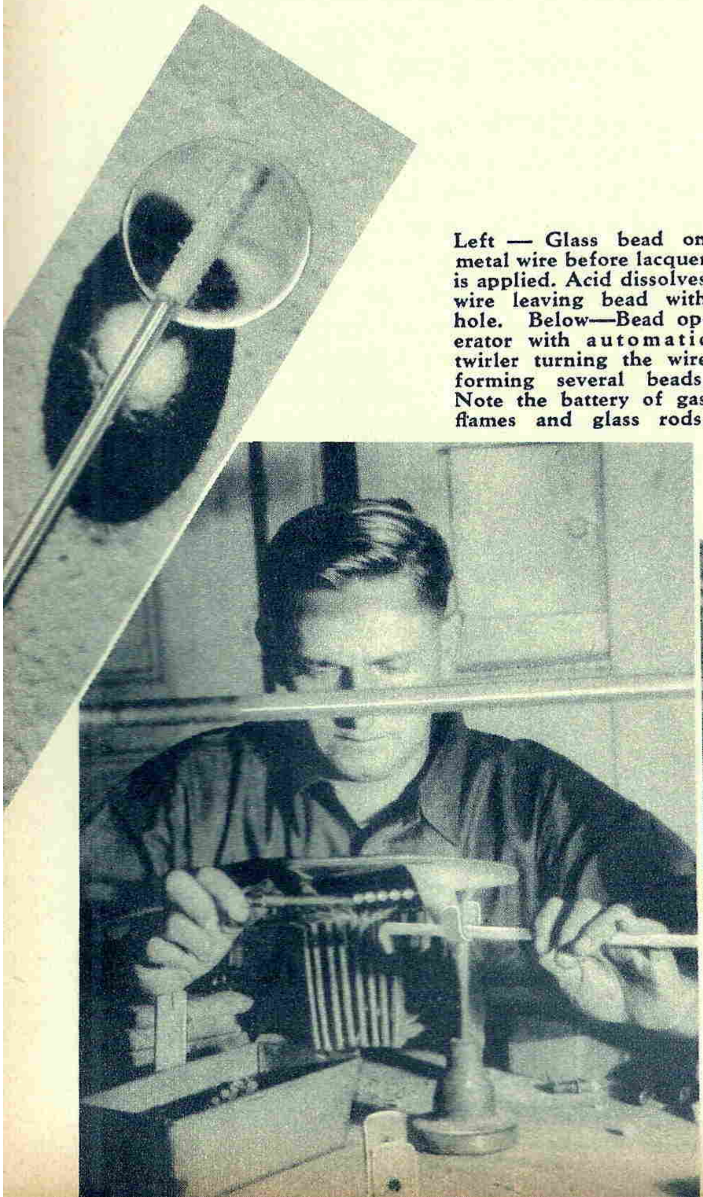
by
Austin C. Lescarboura



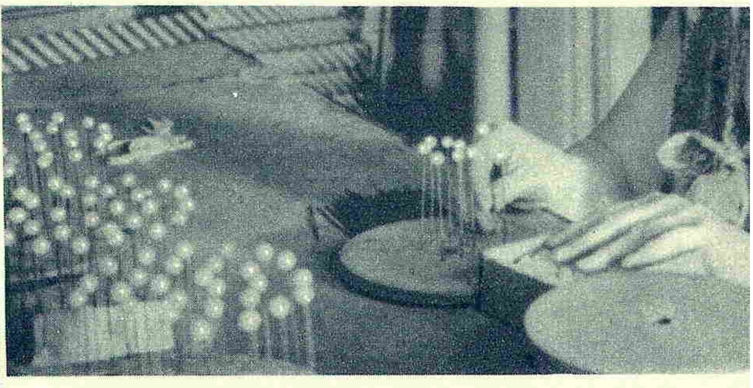
Left—Carl G. Pfeiffer, inventor of the indestructible imitation pearl, is shown studying examples of his handicraft. Only an expert is able to tell difference between the oyster's product and Pfeiffer's.

A WOMAN'S temper turned the trick. When that musical comedy star whipped the sticky necklace about the head of the imitation-pearl importer, she started a new industry with a bang. Staged in a Fifth Avenue jewelry shop two decades ago, that episode furnished the incentive for an outstanding career of research leading up to the present American indestructible pearl industry and the emancipation of our ladies from the horror of gelatinous black rings about their fair necks. Pearl necklaces today no longer run at the first sign of warm weather. Nor do they cost a fortune.

Fresh from the Wild West of Colorado and



Left — Glass bead on metal wire before lacquer is applied. Acid dissolves wire leaving bead with hole. Below—Bead operator with automatic twirler turning the wire forming several beads. Note the battery of gas flames and glass rods.



Above—Worker placing glass beads on wires or toothpicks and then placing them on circular discs for dipping in lacquer. After dipping they remain on discs during drying operation. Repeated dipping and drying gives desired sheen.

OYSTER At ITS OWN GAME

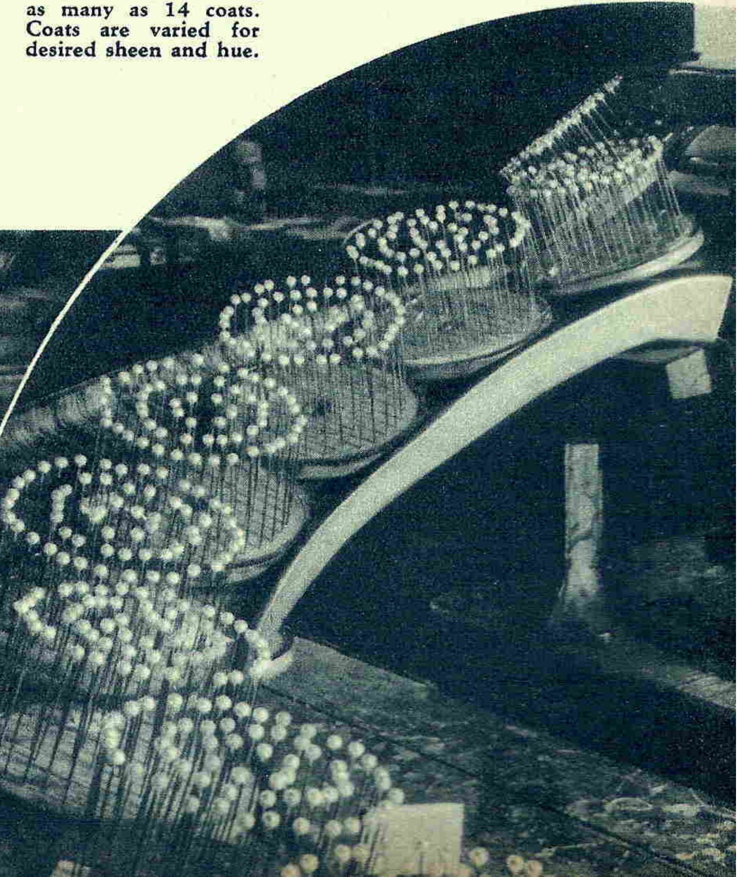
wearing a seventeen dollar Stetson with genuine hand-tooled leather band, Carl Pfeiffer stepped into the picture as his cousin, that pearl importer, stood pondering over the future of the imitation pearl necklace trade. Carl was the friend in need. Despite his protests—he had never seen the ocean, much less an oyster at work—Carl was told he must now turn oyster and produce indestructible pearls forthwith. To complicate matters, this cowboy was neither chemist nor mechanic. He had come to New York to seek fame and fortune on the vaudeville stage. But no matter: he was now commissioned to create artificial pearls which would defy warm weather, perspiration and age, and which would match the natural product in shimmery beauty.

And so the erstwhile cowboy and would-be actor went to work. For months he haunted the libraries, poring every bit of literature on pearls. He supported several translators. From the start he ruled against the alabaster support heretofore used for making imitation pearls, and insisted on glass. Soon he evolved a means of making glass beads in quantities and of various graded sizes.

With suitable glass beads available, Carl turned to the intricate subject of coating. He decided to retain the essence d'orient or pearly solution used by the French and other pearl artisans. But he flatly rejected the

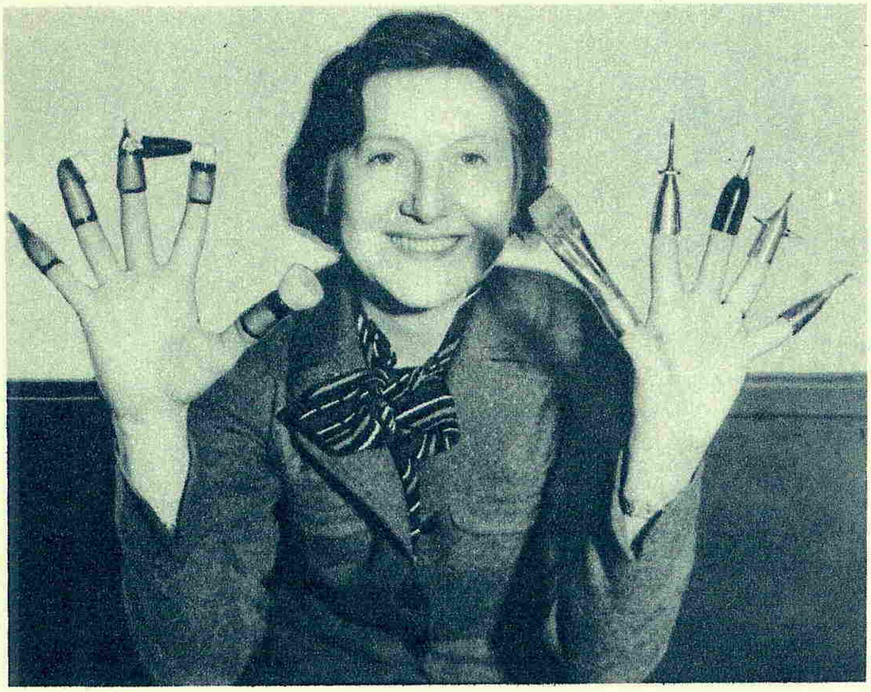
[*Continued on page* 142]

Above — Better grade beads are sprayed with lacquer, some receiving as many as 14 coats. Coats are varied for desired sheen and hue.



Above—Dipping a number of beads at the same time. They are then placed on automatic dryer in background. Right—Hand dipped pearls coming off automatic dryer after half hour twirling period.

Small Utility Tools Are Attached To Finger Tips



Miss Lillian Greneker, New York artist, illustrates her invention which she claims may revolutionize the use of hands and fingers in arts, crafts and industry. Thimble-like devices are attached to the finger tips.

SMALL utility tools fitted on the finger tips are the invention of Miss Lillian Greneker, New York artist.

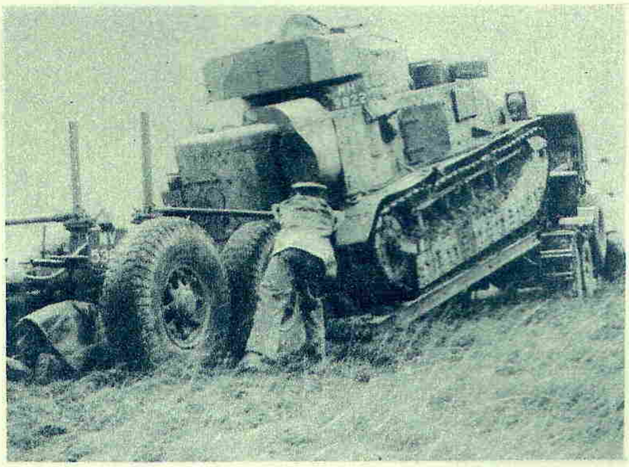
This invention, she claims, may well revolutionize the use of the hands and fingers in the arts, crafts and industry. Tentatively named "Fingertips," the thimble-like devices extend vertically from the finger tips. The tools, in fact, become extensions of the fingers which are thus released as independent agents capable of performing the work normally required of the hand or a combination of several fingers.

Among the objects attached to the fingers in this manner are various sizes and types of brushes, a crochet needle and pencils.

Special Truck Recovers Tank

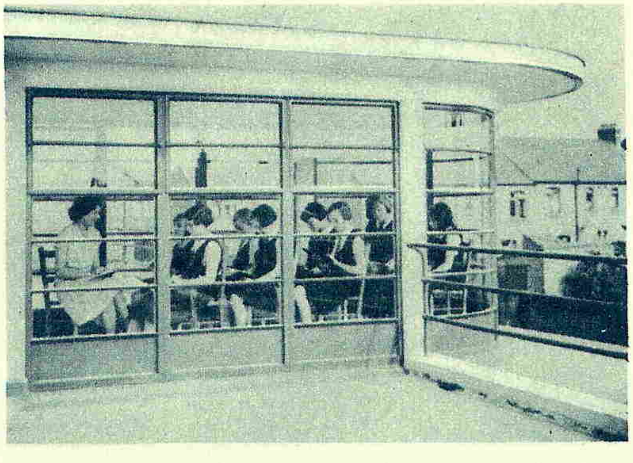
A RECOVERY squad has been attached to the Royal Tanks Corps for the purpose of recovering tanks which have become stranded. Mobile repair shops have been provided for necessary repairs after the tanks have been brought back from the field.

A special tank carrier, known as a transporter, is capable of pulling the stranded tank up onto its platform from the ground. A hawser, operated by the transporter's engine, pulls the tank onto the runners leading to the truck platform.



Stranded tank being loaded on special truck used by the Royal Tanks Corps in England. Equipment makes possible fast loading from ground to truck. Truck engine furnishes power.

Botany Taught In Solarium

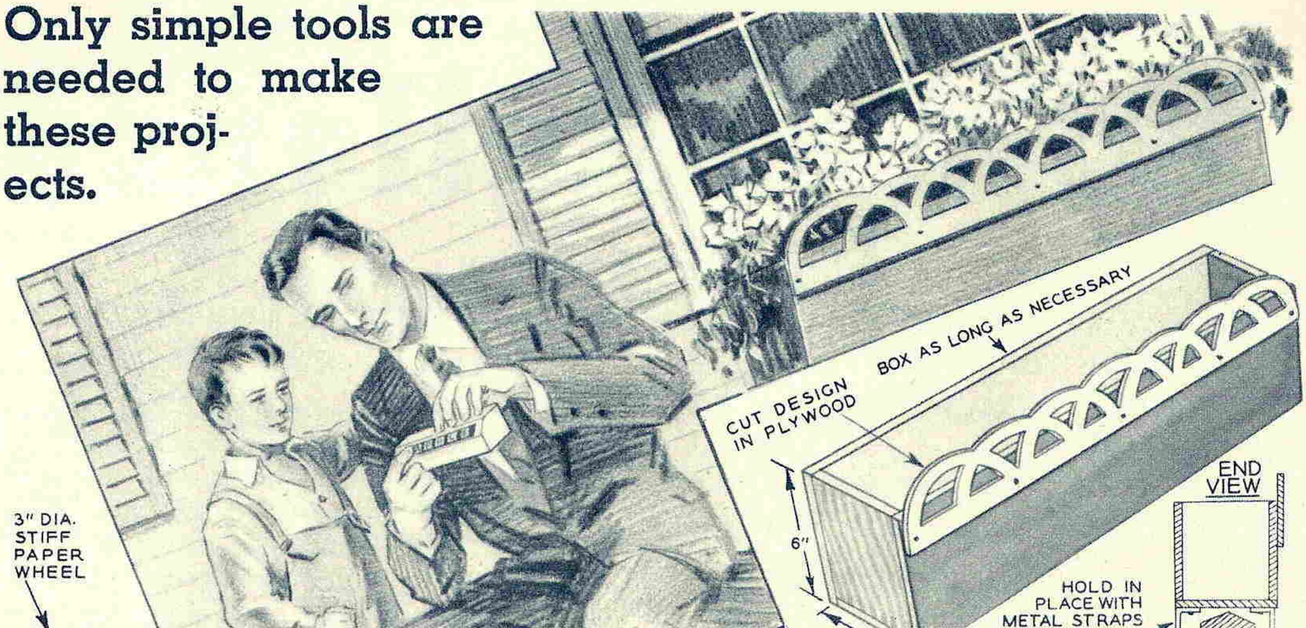


Students attending botany class in the new domestic science school in Ilford, England. Building is designed to permit students to have a maximum of sunlight during class periods.

A NEW domestic science school recently has been opened at Ilford, England, in which the students attend botany classes in a solarium. Designed along modern and original lines, the school building permits a maximum of sunlight to the class room.

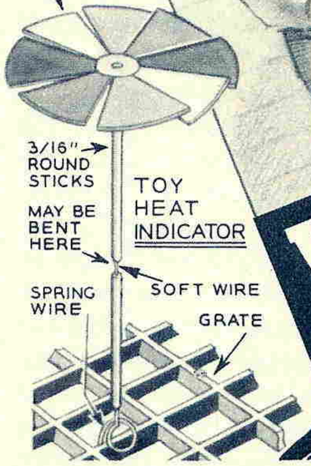
The school has its own telephones, gas and electric cookers, a model drawing room, bedroom, bathroom, and kitchen for teaching.

Only simple tools are needed to make these projects.

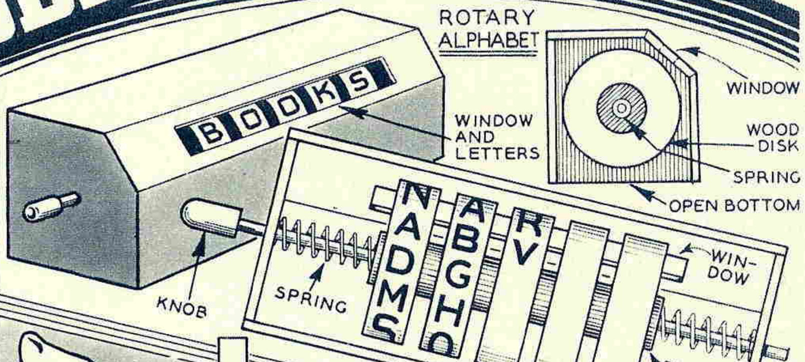

BOX AS LONG AS NECESSARY
CUT DESIGN IN PLYWOOD
END VIEW
6"
4"
HOLD IN PLACE WITH METAL STRAPS TO PORCH RAIL

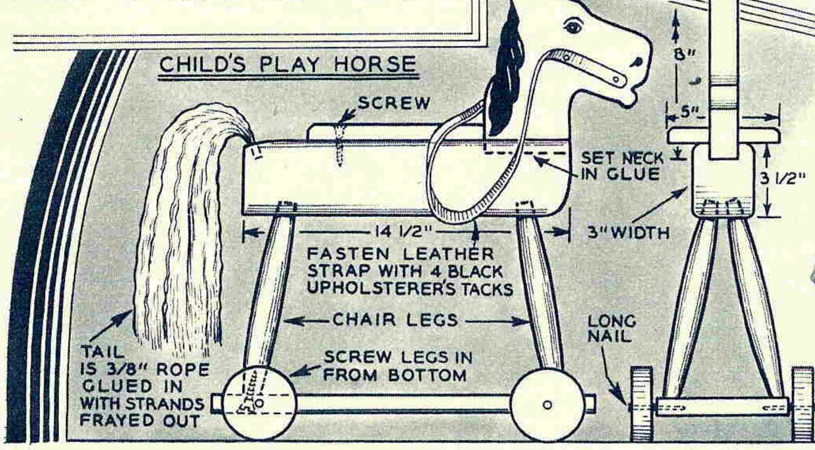
WORKSHOP HOBBIES

This decorative window box will add beauty to the surroundings of any home. Construct the box from any stock to the dimensions indicated above. Cut the trimming from plywood and paint it a color that will contrast well with the flower box.


3" DIA. STIFF PAPER WHEEL
3/16" ROUND STICKS
MAY BE BENT HERE
TOY HEAT INDICATOR
SOFT WIRE
SPRING WIRE
GRATE

Installed over a heating or ventilating grill, this colorful pinwheel provides an interesting toy for small children and at the same time shows the amount of air circulating through the room. Cut the blades from colored paper and glue to a cardboard hub. Assemble the propeller to the end of a 3/16" dowel with a pin.


ROTARY ALPHABET
BOOKS
WINDOW AND LETTERS
WINDOW
WOOD DISK
SPRING
OPEN BOTTOM
KNOB
SPRING
NADMS
ABGHO
RV
WINDOW
RUBBER SPACER


CHILD'S PLAY HORSE
SCREW
SET NECK IN GLUE
8"
5"
3 1/2"
14 1/2"
3" WIDTH
FASTEN LEATHER STRAP WITH 4 BLACK UPHOLSTERER'S TACKS
CHAIR LEGS
LONG NAIL
TAIL IS 3/8" ROPE GLUED IN WITH STRANDS FRAYED OUT
SCREW LEGS IN FROM BOTTOM

Any small child would be proud to own this clever little play-horse. All materials necessary for its construction can be found in any home workshop. The body is a length of floor beam cut and planed to the shape shown, while the legs are salvaged from an otherwise useless chair. Cut the head and saddle from pine stock and make the tail from a length of frayed manilla rope. Complete the horse by mounting it on a suitable base, fitted with small wooden wheels, and paint it in bright colors.

This ingenious spelling box provides the growing child with a toy that has a considerable educational value. The box, fashioned from plywood as described above, contains five discs on which are painted the various characters in the alphabet. The discs revolve on a dowel shaft fitted with small wooden knobs which project from the ends. A friction drive provided by the two light springs on each end of the dowel and the rubber spacer washers between each alphabet disc permits spelling any 5-letter word.

Build A Bellanca

Powered by a miniature gasoline engine, this realistic model will thrill you with its flights.

by Fred C. Tuxworth

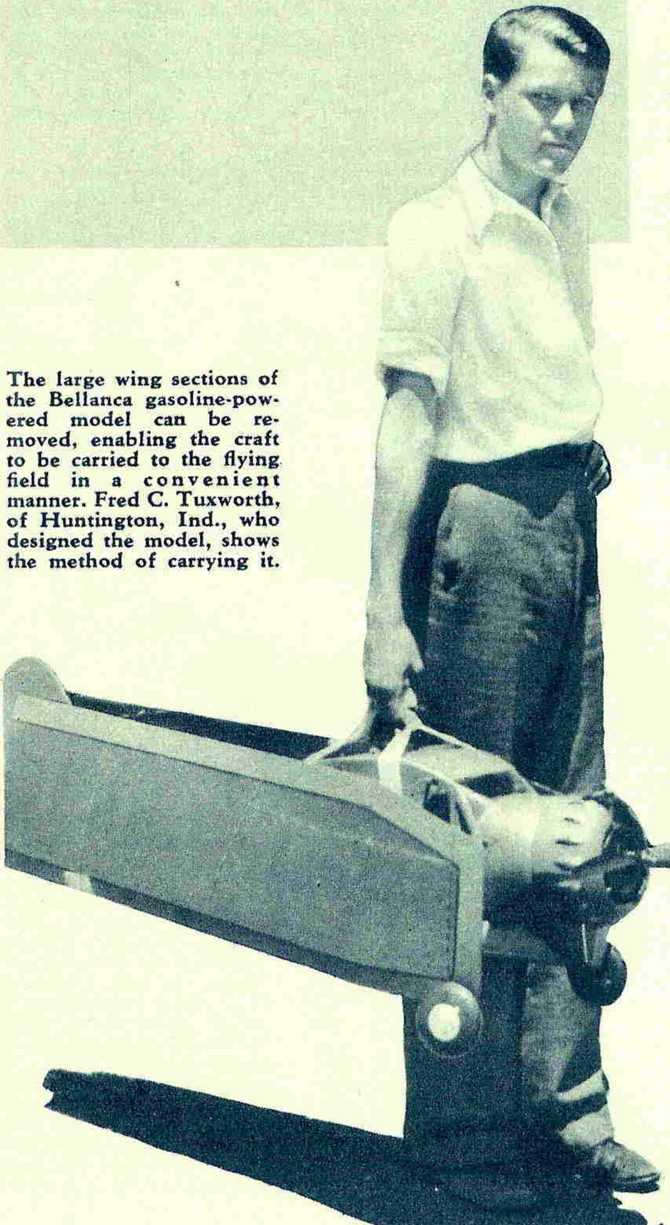
PART I

THE gasoline-powered model described here is a scale reproduction of the Bellanca Skyrocket, a six-place ship powered by a Pratt & Whitney 550 h.p. Wasp. This ship lends itself admirably to model building. Its 7′ 5½″ span and narrow chord wing, large tail surfaces, lift-type fuselage, lift-type struts, streamlines and characteristic airfoil section insure good stability along all axis. Because of its structural arrangement, the construction of the model is simple, differing very little, except in size, from that of detailed rubber powered models of the scale flying type.

The original model was designed and built within three weeks. This was made possible by the simplified fittings and the methods used in construction. However, since completion, the model has undergone several minor changes, receiving more strength in some places and a reduction in weight where strength had originally been over-emphasized. As a result, the model presented is a "tried-till-proven" one. By adapting the motor mount to its dimensions, any engine of one-fifth or one-sixth horsepower can be used. By following the methods explained here, you can build this model in a minimum of time and at a minimum cost.

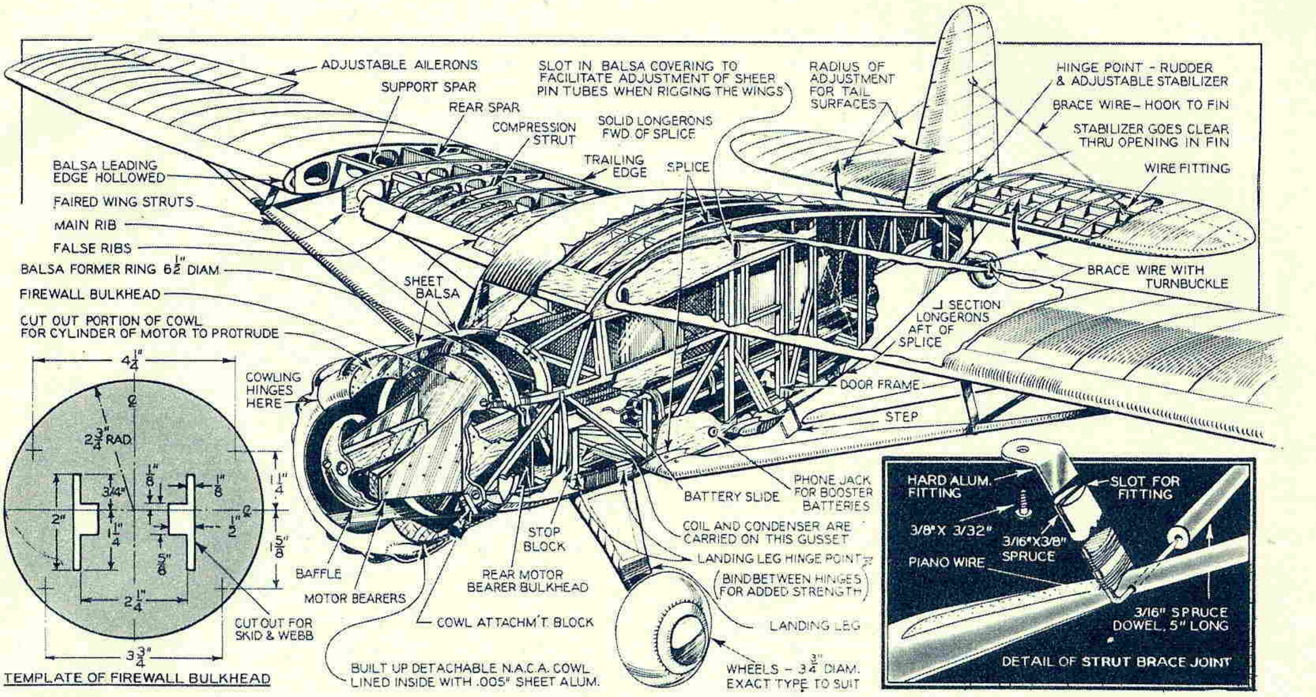
One of the time-saving tools used in construction was a piece of white pine approximately ¾″ by 3″ by 12″ to which was fastened, by small tacks, very coarse sandpaper of the type used on large power-sanding tools. This made it possible to sandpaper many parts only partially shaped while assembling. This not only saves time but improves the appearance of the model generally, as all joints should be gone over before the fuselage and wings are covered.

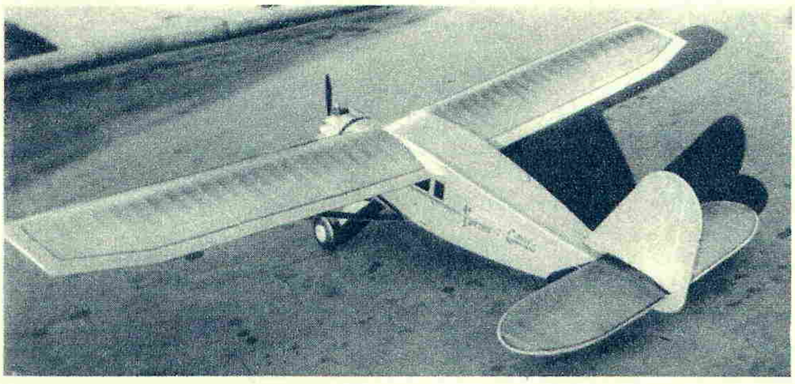
Almost all of the parts can be cut from a plank of hard balsa wood, except where otherwise specified. You can have the cutting done at the nearest lumbermill for a surprisingly small cost. A small, home-workshop circular saw,



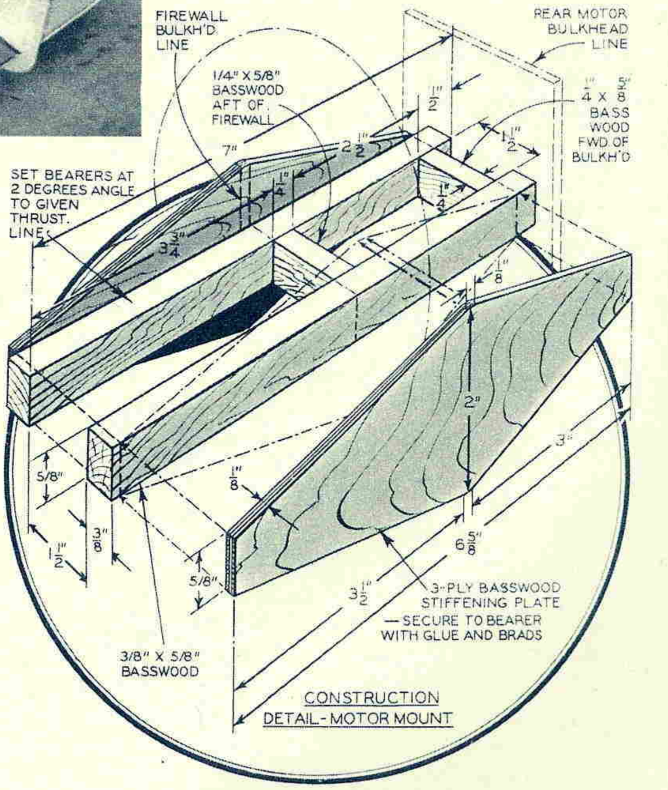
The large wing sections of the Bellanca gasoline-powered model can be removed, enabling the craft to be carried to the flying field in a convenient manner. Fred C. Tuxworth, of Huntington, Ind., who designed the model, shows the method of carrying it.

"Gas" Model Plane


ADJUSTABLE AILERONS
SUPPORT SPAR
REAR SPAR
COMPRESSION STRUT
SOLID LONGERONS FWD OF SPLICE
SLOT IN BALSA COVERING TO FACILITATE ADJUSTMENT OF SHEER PIN TUBES WHEN RIGGING THE WINGS
RADIUS OF ADJUSTMENT FOR TAIL SURFACES
HINGE POINT - RUDDER & ADJUSTABLE STABILIZER
BRACE WIRE - HOOK TO FIN
STABILIZER GOES CLEAR THRU OPENING IN FIN
WIRE FITTING
BALSA LEADING EDGE HOLLOWED
TRAILING EDGE
SPLICE
FAIRED WING STRUTS
MAIN RIB
FALSE RIBS
BALSA FORMER RING 6 1/2" DIAM
SHEET BALSA
FIREWALL BULKHEAD
BRACE WIRE WITH TURNBUCKLE
CUT OUT PORTION OF COWL FOR CYLINDER OF MOTOR TO PROTRUDE
⊥ SECTION LONGERONS AFT OF SPLICE
COWLING HINGES HERE
DOOR FRAME
STEP
4 1/4"
2 3/4" RAD
3/4"
1/8"
1/8"
2"
1 1/4"
1/2"
1 1/4"
1 5/8"
5/8"
2 1/4"
3 3/4"
CUT OUT FOR SKID & WEBB
TEMPLATE OF FIREWALL BULKHEAD
BAFFLE
MOTOR BEARERS
STOP BLOCK
REAR MOTOR BEARER BULKHEAD
BATTERY SLIDE
PHONE JACK FOR BOOSTER BATTERIES
COIL AND CONDENSER ARE CARRIED ON THIS GUSSET
LANDING LEG HINGE POINT
BIND BETWEEN HINGES FOR ADDED STRENGTH
COWL ATTACHM'T BLOCK
LANDING LEG
BUILT UP DETACHABLE N.A.C.A. COWL LINED INSIDE WITH .005" SHEET ALUM.
WHEELS - 3 3/4" DIAM. EXACT TYPE TO SUIT
HARD ALUM. FITTING
SLOT FOR FITTING
3/8" X 3/32"
3/16" X 3/8" SPRUCE
PIANO WIRE
3/16" SPRUCE DOWEL, 5" LONG
DETAIL OF STRUT BRACE JOINT

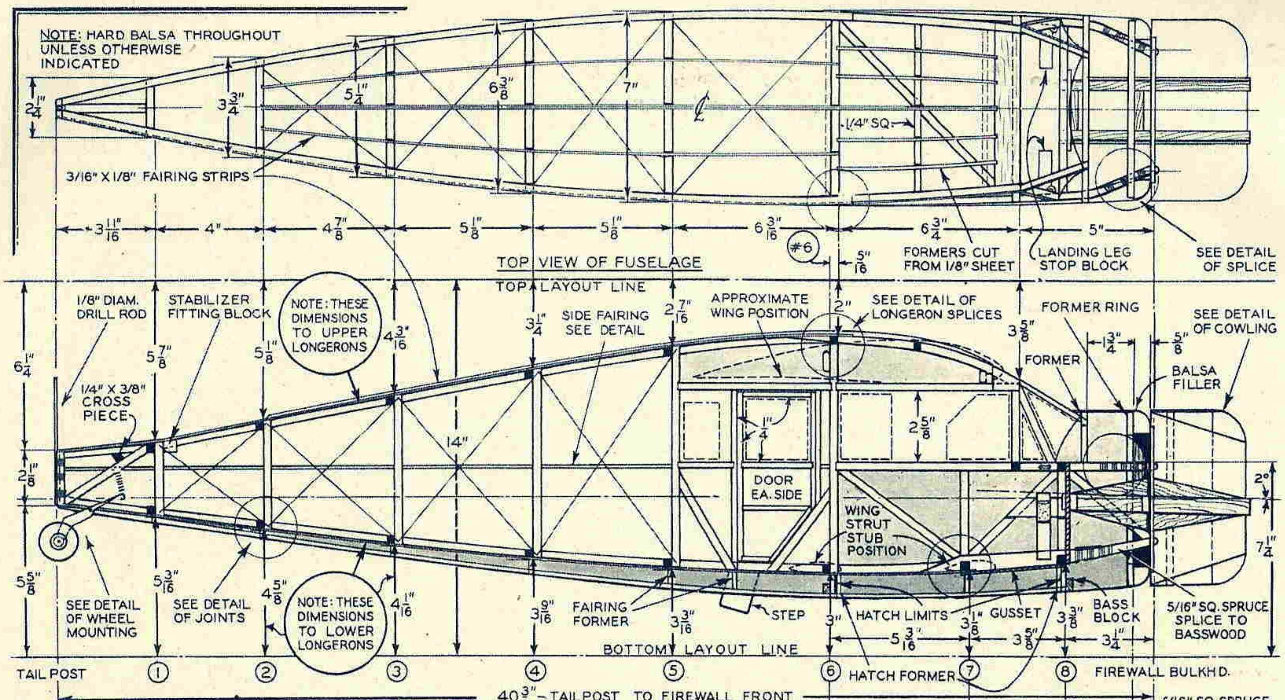


The perspective cut-away drawing of the complete model (above) shows proper relationship of the integral parts. The smaller sketches show firewall bulkhead template and manner of attaching strut braces. Left—Three-quarter rear view. Below—Sketch of motor mount details.


FIREWALL BULKH'D LINE
REAR MOTOR BULKHEAD LINE
1/4" X 5/8" BASSWOOD AFT OF FIREWALL
1/2"
1/4" X 5/8" BASS WOOD FWD OF BULKH'D
7"
2 1/2"
1 1/2"
SET BEARERS AT 2 DEGREES ANGLE TO GIVEN THRUST LINE
1/4"
1/4"
3 3/4"
1/8"
2"
3"
5/8"
1/8"
1 1/2"
3/8"
5/8"
6 5/8"
3 1/2"
3-PLY BASSWOOD STIFFENING PLATE — SECURE TO BEARER WITH GLUE AND BRADS
3/8" X 5/8" BASSWOOD
CONSTRUCTION DETAIL - MOTOR MOUNT

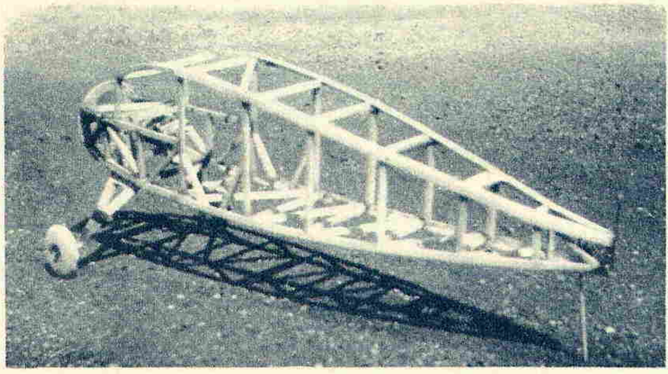
if available, is fine for this. If you wish, you may also make your own glue—one part of clear airplane dope to one part of alcohol, with enough celluloid (old airplane windshields) added to thicken it. This will do fine but will not dry quite so rapidly as the commercial products.

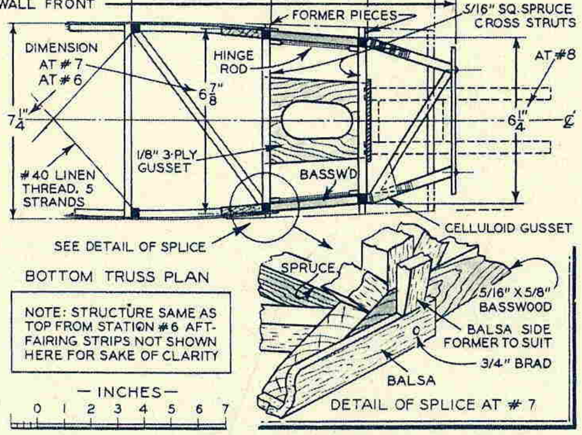
The fuselage is undertaken first. It presents no unusual difficulty but does, however, necessitate careful construction and study of the plans. The forward part is much more strongly constructed than the after part. This is natural because of the more extreme forces it must sustain. The fore end of the lower longerons, to which the landing gears are attached, is of basswood cut as shown, and the fore part of the upper longerons is cut from $\frac{5}{16}$" hard sheet balsa. The after end of both


NOTE: HARD BALSA THROUGHOUT UNLESS OTHERWISE INDICATED
2 1/4"
3 3/4"
5 1/4"
6 3/8"
7"
1/4" SQ.
3/16" X 1/8" FAIRING STRIPS
3 11/16
4"
4 7/8
5 1/8
5 1/8
6 3/16
#6
5/16
6 3/4
5"
FORMERS CUT FROM 1/8" SHEET
LANDING LEG STOP BLOCK
SEE DETAIL OF SPLICE
TOP VIEW OF FUSELAGE
TOP LAYOUT LINE
1/8" DIAM. DRILL ROD
STABILIZER FITTING BLOCK
NOTE: THESE DIMENSIONS TO UPPER LONGERONS
SIDE FAIRING SEE DETAIL
APPROXIMATE WING POSITION
SEE DETAIL OF LONGERON SPLICES
FORMER RING
SEE DETAIL OF COWLING
6 1/4"
5 7/8
5 1/8
4 3/16
3 1/4
2 7/16
2"
3 5/8
1 3/4
5/8
FORMER
BALSA FILLER
1/4" X 3/8" CROSS PIECE
14"
1"
2 5/8
2 1/8
DOOR EA. SIDE
WING STRUT STUB POSITION
2°
7 1/4
5 5/8
5 3/16
4 5/8
4 1/16
SEE DETAIL OF WHEEL MOUNTING
SEE DETAIL OF JOINTS
NOTE: THESE DIMENSIONS TO LOWER LONGERONS
3 9/16
FAIRING FORMER
3 3/8
STEP
3"
HATCH LIMITS
1"
3 3/8
GUSSET
3 3/8
BASS BLOCK
5/16" SQ. SPRUCE SPLICE TO BASSWOOD
5 3/16
3 5/8
3 1/4
BOTTOM LAYOUT LINE
TAIL POST
①
②
③
④
⑤
⑥
HATCH FORMER
⑦
⑧
FIREWALL BULKHD.

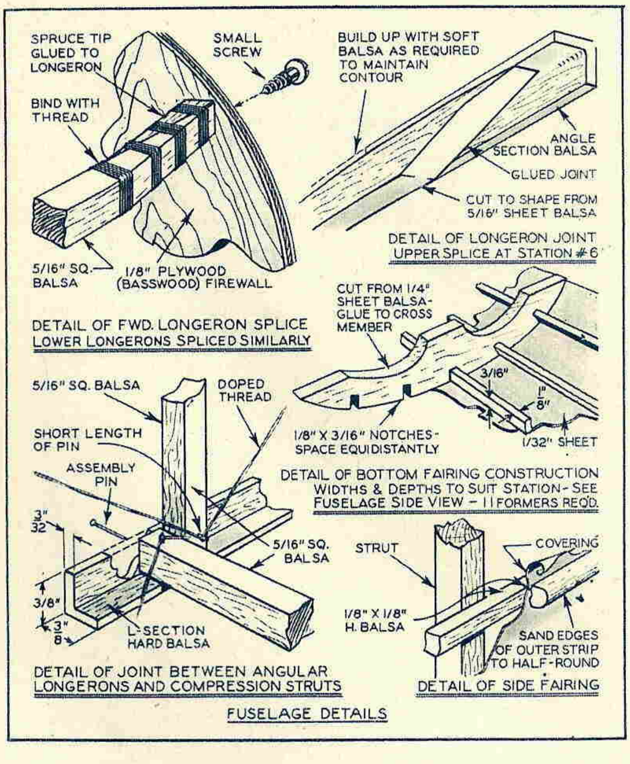
40 3/4"–TAILPOST TO FIREWALL FRONT

SIDE VIEW OF FUSELAGE—SHOWN IN LONGITUDINAL SECTION THROUGH ℄




FORMER PIECES
5/16" SQ. SPRUCE CROSS STRUTS
DIMENSION AT #7 AT #6
HINGE ROD
AT #8
7 1/4"
6 7/8
6 1/4"
℄
#40 LINEN THREAD, 5 STRANDS
1/8" 3-PLY GUSSET
BASSWD
CELLULOID GUSSET
SEE DETAIL OF SPLICE
BOTTOM TRUSS PLAN
NOTE: STRUCTURE SAME AS TOP FROM STATION #6 AFT-FAIRING STRIPS NOT SHOWN HERE FOR SAKE OF CLARITY
—INCHES—
0 1 2 3 4 5 6 7
SPRUCE
5/16" X 5/8" BASSWOOD
BALSA SIDE FORMER TO SUIT
3/4" BRAD
BALSA
DETAIL OF SPLICE AT # 7

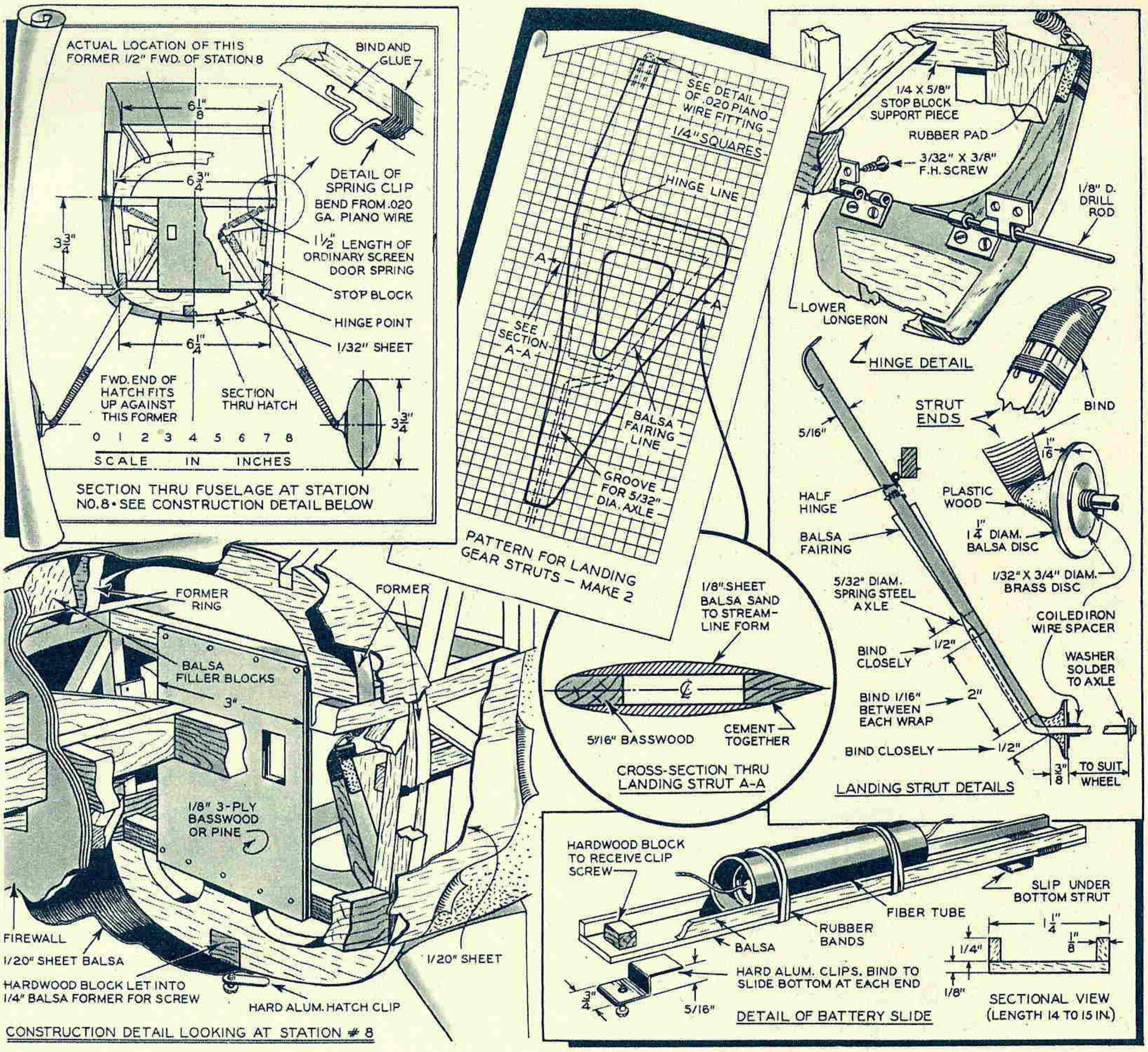
Completed fuselage (left) is sturdy in construction. Above—Fuselage layout diagram. Hard balsa is used throughout except where otherwise indicated. Lower left—Fuselage details.


SPRUCE TIP GLUED TO LONGERON
SMALL SCREW
BIND WITH THREAD
5/16" SQ. BALSA
1/8" PLYWOOD (BASSWOOD) FIREWALL
DETAIL OF FWD. LONGERON SPLICE
LOWER LONGERONS SPLICED SIMILARLY
BUILD UP WITH SOFT BALSA AS REQUIRED TO MAINTAIN CONTOUR
ANGLE SECTION BALSA
GLUED JOINT
CUT TO SHAPE FROM 5/16" SHEET BALSA
DETAIL OF LONGERON JOINT
UPPER SPLICE AT STATION #6
CUT FROM 1/4" SHEET BALSA-GLUE TO CROSS MEMBER
3/16"
1"
8"
1/8" X 3/16" NOTCHES-SPACE EQUIDISTANTLY
1/32" SHEET
DETAIL OF BOTTOM FAIRING CONSTRUCTION
WIDTHS & DEPTHS TO SUIT STATION-SEE FUSELAGE SIDE VIEW - 11 FORMERS REQD.
5/16" SQ. BALSA
DOPED THREAD
SHORT LENGTH OF PIN
ASSEMBLY PIN
3/32"
5/16" SQ. BALSA
3/8"
3/8"
L-SECTION HARD BALSA
DETAIL OF JOINT BETWEEN ANGULAR LONGERONS AND COMPRESSION STRUTS
STRUT
COVERING
1/8" X 1/8" H. BALSA
SAND EDGES OF OUTER STRIP TO HALF-ROUND
DETAIL OF SIDE FAIRING
FUSELAGE DETAILS

upper and lower longerons is of angle section to provide greater area for the glue joints. Splice the longerons and assemble one side of the fuselage on a full size lay-out using brads for a jig, and with the inside of the framework facing upward. While it is still in the jig, each bay in the after end of the frame should be cross-braced with five strands of No. 40 linen thread. This is done by pressing and gluing pins in the end of each of the cross members and lacing the thread around the pins. The thread is given several coats of dope and when dry the pins may be cut off 1/8" from the members.

When the whole assembly is well dried, remove from the jig and turn it over, so that now the outside of the frame faces upward, then build the other side of the fuselage on it, again using brads to keep them alike.

When the sides are finished, join them with the top and bottom members in the usual


ACTUAL LOCATION OF THIS FORMER 1/2" FWD. OF STATION 8
BIND AND GLUE
$6\frac{1}{8}$"
$6\frac{3}{4}$"
$3\frac{3}{4}$"
DETAIL OF SPRING CLIP
BEND FROM .020 GA. PIANO WIRE
$1\frac{1}{2}$" LENGTH OF ORDINARY SCREEN DOOR SPRING
STOP BLOCK
HINGE POINT
$6\frac{1}{4}$"
1/32" SHEET
FWD. END OF HATCH FITS UP AGAINST THIS FORMER
SECTION THRU HATCH
$3\frac{3}{4}$"
0 1 2 3 4 5 6 7 8
SCALE IN INCHES
SECTION THRU FUSELAGE AT STATION NO. 8 • SEE CONSTRUCTION DETAIL BELOW
SEE DETAIL OF .020 PIANO WIRE FITTING
1/4" SQUARES
HINGE LINE
A
A
SEE SECTION A-A
BALSA FAIRING LINE
GROOVE FOR 5/32" DIA. AXLE
PATTERN FOR LANDING GEAR STRUTS — MAKE 2
1/4 X 5/8" STOP BLOCK SUPPORT PIECE
RUBBER PAD
3/32" X 3/8" F.H. SCREW
1/8" D. DRILL ROD
LOWER LONGERON
HINGE DETAIL
STRUT ENDS
BIND
5/16"
1/16"
HALF HINGE
PLASTIC WOOD
BALSA FAIRING
$1\frac{1}{4}$" DIAM. BALSA DISC
1/32" X 3/4" DIAM. BRASS DISC
5/32" DIAM. SPRING STEEL AXLE
COILED IRON WIRE SPACER
1/8" SHEET BALSA SAND TO STREAMLINE FORM
BIND CLOSELY
1/2"
WASHER SOLDER TO AXLE
BIND 1/16" BETWEEN EACH WRAP
2"
BIND CLOSELY
1/2"
3/8"
TO SUIT WHEEL
LANDING STRUT DETAILS
5/16" BASSWOOD
CEMENT TOGETHER
CROSS-SECTION THRU LANDING STRUT A-A
FORMER RING
FORMER
BALSA FILLER BLOCKS
3"
1/8" 3-PLY BASSWOOD OR PINE
FIREWALL
1/20" SHEET BALSA
HARDWOOD BLOCK LET INTO 1/4" BALSA FORMER FOR SCREW
HARD ALUM. HATCH CLIP
1/20" SHEET
CONSTRUCTION DETAIL LOOKING AT STATION #8
HARDWOOD BLOCK TO RECEIVE CLIP SCREW
SLIP UNDER BOTTOM STRUT
FIBER TUBE
RUBBER BANDS
BALSA
$1\frac{1}{4}$"
1/4"
1/8"
HARD ALUM. CLIPS. BIND TO SLIDE BOTTOM AT EACH END
3/4"
5/16"
1/8"
DETAIL OF BATTERY SLIDE
SECTIONAL VIEW (LENGTH 14 TO 15 IN.)

A scale pattern for making the landing gear struts is shown in the top-center drawing. Method of hinging and attaching to fuselage is shown in other drawings. The details of the battery slide-holder are shown in drawing directly above.

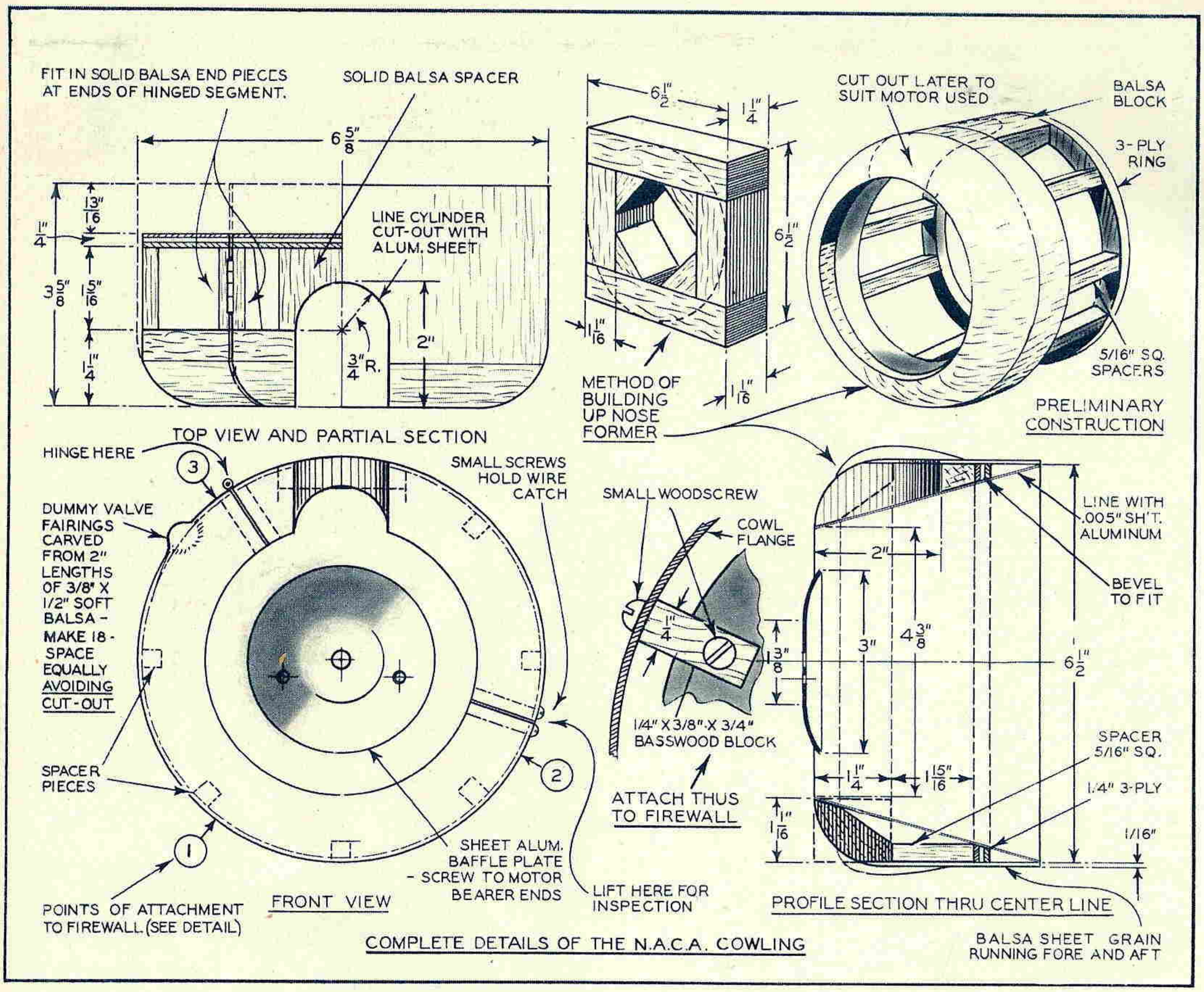
manner. The spruce bottom members, immediately fore and aft of the landing legs, are joined to the longerons by one-inch brads. Pins and cement will do for the joints of balsa cross-members and solid longerons.

The fire wall, of basswood plywood, is held by screws and glue to four small pieces of spruce, which are in turn attached by glue and thread to the frame, as shown in the drawing.

The landing gear legs are made and attached next. They are cut from basswood with a jig saw and faired with balsa. The hinges, which were purchased at 5-10c store, have the pins pressed out and a piece of ⅛″ drill-rod substituted. The landing legs are detached by removing this drill-rod pin and the shock absorber springs, which are sections cut from a screen door spring. Screws and glue hold the hinges in place and the longerons are bound afterwards to prevent splitting. Be sure to use at least $\frac{5}{32}$″ diameter spring steel for the axles. These are bent to shape and ground, so that they will be flush with the grooves cut for them. Pneumatic-tired wheels should be used to insure shock-proof landings.

When the basic fuselage framework and the landing gear are completed, the motor mount should be undertaken. The bass plywood is secured to the basswood skids with glue and ½″ brads. The motor bearers then are attached to the fuselage as shown in the drawing, glue and brads being used throughout. Use screws to fasten the engine. The placement of the gas tank depends, of course, upon the engine used.

The forward part of the fuselage is covered with 1/20″ hard balsa veneer. The curved part immediately aft of the fire wall is formed


FIT IN SOLID BALSA END PIECES AT ENDS OF HINGED SEGMENT.
SOLID BALSA SPACER
6 5/8"
13/16"
1/4"
LINE CYLINDER CUT-OUT WITH ALUM. SHEET
3 5/8"
1 5/16"
2"
3/4" R.
1 1/4"
TOP VIEW AND PARTIAL SECTION
6 1/2"
1 1/4"
6 1/2"
1 1/16"
1 1/16"
METHOD OF BUILDING UP NOSE FORMER
CUT OUT LATER TO SUIT MOTOR USED
BALSA BLOCK
3-PLY RING
5/16" SQ. SPACERS
PRELIMINARY CONSTRUCTION
HINGE HERE
3
DUMMY VALVE FAIRINGS CARVED FROM 2" LENGTHS OF 3/8" X 1/2" SOFT BALSA - MAKE 18 - SPACE EQUALLY AVOIDING CUT-OUT
SMALL SCREWS HOLD WIRE CATCH
SPACER PIECES
2
1
SHEET ALUM. BAFFLE PLATE - SCREW TO MOTOR BEARER ENDS
POINTS OF ATTACHMENT TO FIREWALL. (SEE DETAIL)
FRONT VIEW
LIFT HERE FOR INSPECTION
SMALL WOODSCREW
COWL FLANGE
1/4"
1 3/8"
1/4" X 3/8" X 3/4" BASSWOOD BLOCK
ATTACH THUS TO FIREWALL
LINE WITH .005" SH'T. ALUMINUM
2"
BEVEL TO FIT
3"
4 3/8"
6 1/2"
SPACER 5/16" SQ.
1 1/4"
1 15/16"
1/4" 3-PLY
1 1/16"
1/16"
PROFILE SECTION THRU CENTER LINE
BALSA SHEET GRAIN RUNNING FORE AND AFT

COMPLETE DETAILS OF THE N.A.C.A. COWLING

Shown above are construction details of the engine cowling, which is hinged at the top, making the engine readily accessible for minor adjustments. The aluminum baffle plate adds to model's appearance.

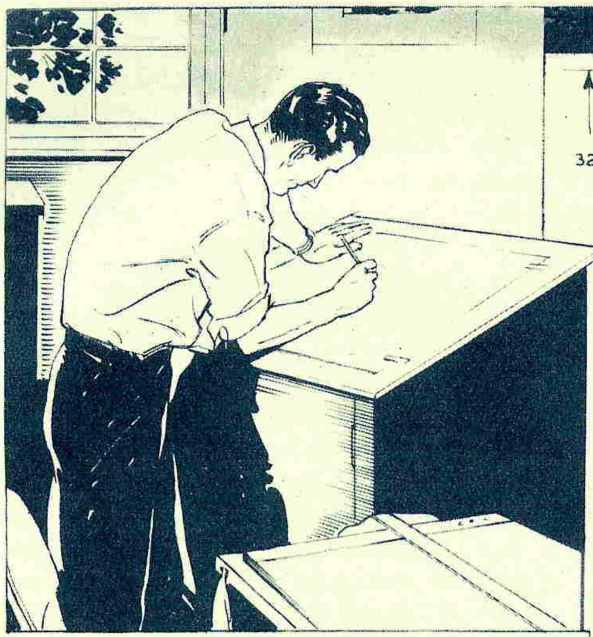
by using a 6½″ diameter ring former which is cut from ¼″ sheet balsa. Build up to it with blocks of medium hard balsa, and sand to shape when dry. The bottom of the fuselage is covered with $\frac{1}{32}$″ medium balsa veneer over formers and fairing strips as shown. The hatch in the bottom, for access to the interior, is also veneer covered. This is held in place with very small screws through sheet aluminum fittings. In all cases when a screw is to be removable, use a basswood block to receive it. The celluloid for the windows and windshield and the rounded wooden strips on the fuselage sides are not put on until the fuselage is covered and ready for finishing.

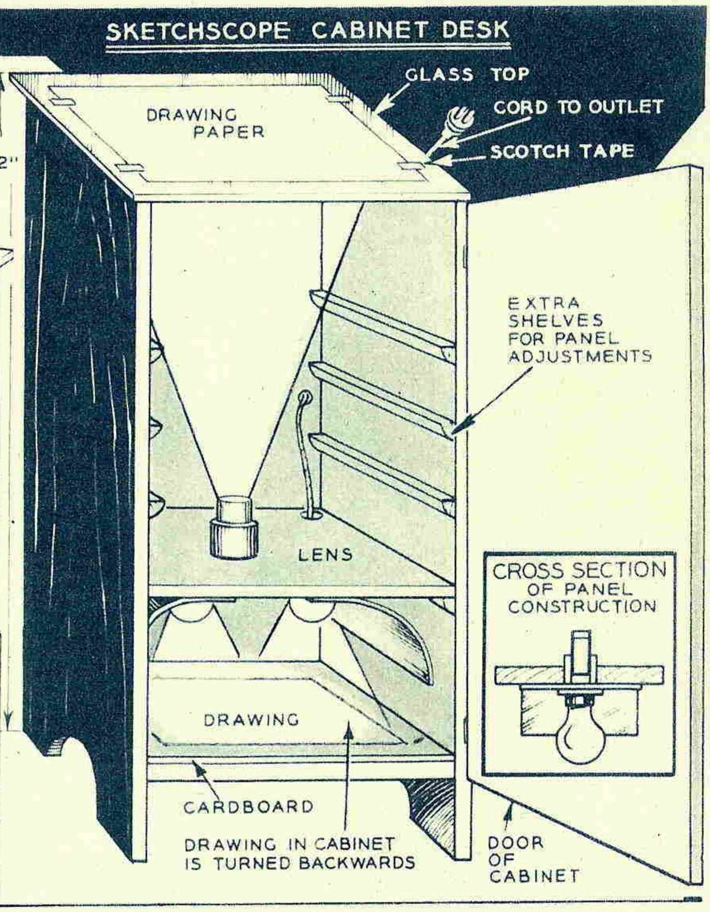
Easy access to the power plant is obtained by providing the N. A. C. A. cowling with a hinged segment. The construction is simple. The curved forward former is made from several blocks of balsa, cut as shown in the detail, glued, and then finished to shape. This is connected to the rear ¼″ balsa ring former by seven pieces of $\frac{5}{16}$″ square balsa equally spaced, with a solid block of balsa at top (see drawing), and then covered with $\frac{1}{16}$″ hard balsa. The streamline bumps are made from balsa blocks cut to fit the cowling contour. Shaping and sandpapering are done after they are glued in place. The segment to be hinged may now be cut and provided with solid ends to hold the hinge and wire hook catch. A block is placed between the two formers at the top from which the hole for the cylinder may be cut. This hole of course must be adapted to the engine used. The fire wall and the entire interior of the cowling are covered with .005″ sheet aluminum held in place by small wire staples and fireproof metal cement.

The cowling is held in place by removable screws in three small basswood blocks that are secured by glue and screws to the firewall. The baffle in front of the crankcase is cut from the rounded bottom of an aluminum pan and held in place with screws running into the ends of the skids. This baffle plate improves the appearance tremendously.

(Concluding installment will appear in August issue.)

PROJECTION BOX MAKES SKETCHING EASY




SKETCHSCOPE CABINET DESK
GLASS TOP
CORD TO OUTLET
SCOTCH TAPE
DRAWING PAPER
32"
EXTRA SHELVES FOR PANEL ADJUSTMENTS
LENS
CROSS SECTION OF PANEL CONSTRUCTION
DRAWING
CARDBOARD
DRAWING IN CABINET IS TURNED BACKWARDS
DOOR OF CABINET

Drawing enlargements of photographs, cartoons or other illustrations is simplicity itself with this unique enlarging device. Consisting of a cabinet fitted with a glass top and a magnifying glass inside, it projects pictures for rapid tracing on the paper placed on top.

ALTHOUGH the making of enlarged sketches of photographs, cartoons and other illustrations usually requires some artistic talent and the use of a pantograph, such is not the case when a "sketchscope" cabinet like the one here described is used. Containing a projecting device similar to the familiar magic lantern, pictures placed in the bottom of the cabinet are thrown on the drawing paper on the top of the cabinet for quick and accurate tracing to any desired size.

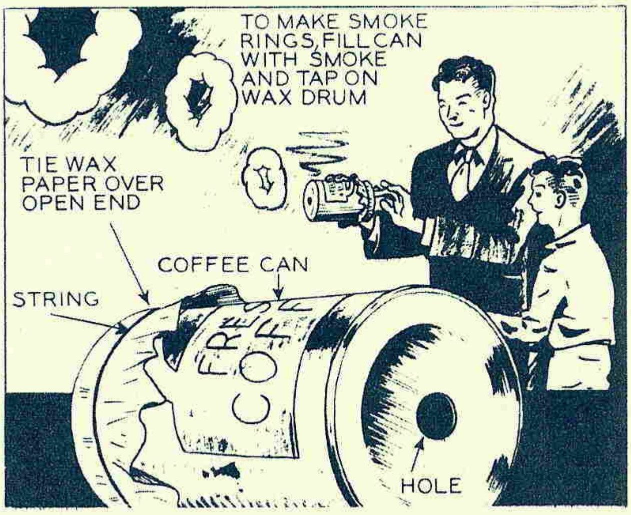
The cabinet is built from ¾-inch plywood or solid stock to the dimensions which best suit the user's particular needs. A suggested height for the cabinet is 32 inches with the width and depth left to the discretion of the builder. Fit the interior of the cabinet with shelf brackets of quarter-round moulding to allow for the insertion of the projection shelf.

The projection shelf is merely a board which can be slipped into any one of the cabinet's shelf brackets and provided with an adjustable magnifying lens working in a sliding tube. The underside of the shelf is fitted with two porcelain cleat sockets and tin reflectors. The photograph to be projected on the top of the cabinet is inserted in the bottom, the lights turned on and the image brought into focus for copying.

If a thin grade of drawing paper is used the projected picture will show through it with sufficient clearness for tracing.

Tin Can Creates Smoke Rings

PERFECT smoke rings can be produced with this simple device which is formed from a coffee tin. In the bottom of the can cut a ¾-inch hole and over the top stretch a tissue paper drum held in place with an elastic. To produce smoke rings blow smoke into the small hole and tap the drum with the finger tips.

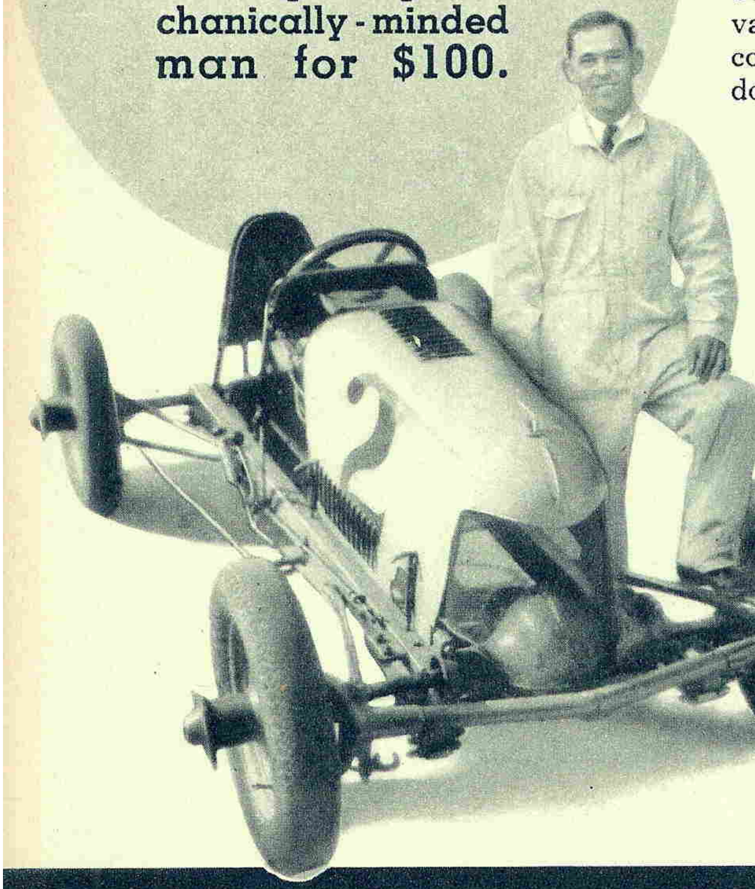

TO MAKE SMOKE RINGS, FILL CAN WITH SMOKE AND TAP ON WAX DRUM
TIE WAX PAPER OVER OPEN END
COFFEE CAN
STRING
FRESH COFFEE
HOLE

Perfect smoke rings can be formed with this device. Fill can with smoke and tap the wax drum with the forefinger.

BUILDING "ARLEN SPECIAL"

by Manley Mills

Constructed from old auto parts and powered with a motorcycle engine, this tiny car can be built by any mechanically-minded man for $100.

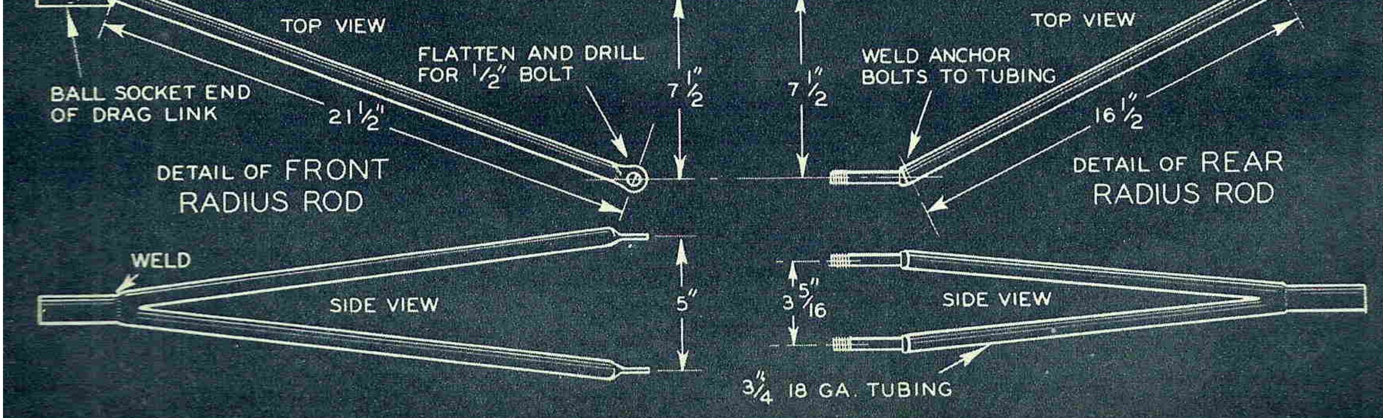


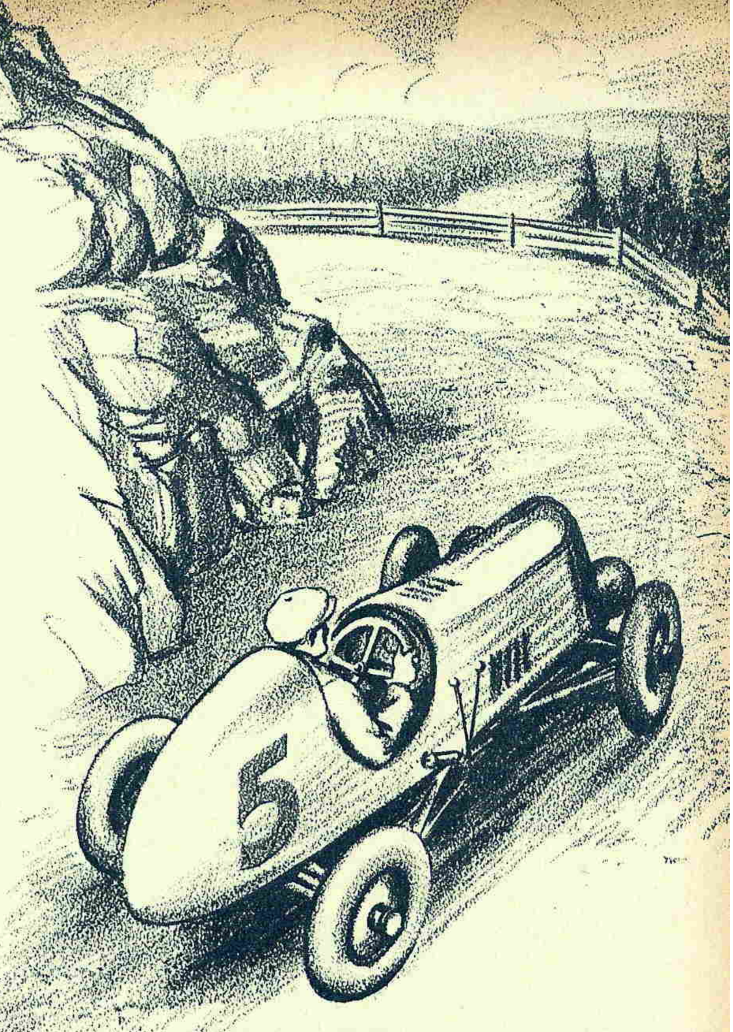
Constructed from parts salvaged from the nearest auto wrecking yard, "Arlen Special" offers the auto racing fan a real chance to develop his creative talents. Power is supplied to the transmission by a motorcycle engine.

WHAT sporting man, after witnessing his first auto marathon, hasn't wished for a racing car of his own even though he has not the slightest intention of entering it in competition? While the more familiar full-size racer is a costly piece of mechanism, there is the Lilliputian version, which is not only capable of terrific speeds, but which can be assembled from standard auto parts salvaged from the nearest wrecking yard at a cost which should not exceed one hundred dollars, including the motor.

The "Arlen Special" is an excellent example of what can be accomplished with a little ingenuity and a few tools. Designed by Don Arlen, a noted Hollywood stunt racer, this tiny car is capable of speeds exceeding 108 miles-per-hour. It has the distinction of being the first American designed midget racer to receive the official sanction of the A.A.A., an honor which speaks for itself.

If you are not already familiar with this midget car, we refer you to the first installment, which appeared in the June issue of MODERN MECHANIX. For the many


SIDE RAIL
1 3/8"
FRONT RADIUS ROD
PLACE DRAG LINK BALL AS SHOWN TO GIVE PROPER CASTER SETTING TO FRONT AXLE
TOP VIEW
BALL SOCKET END OF DRAG LINK
21 1/2"
FLATTEN AND DRILL FOR 1/2" BOLT
7 1/2"
DETAIL OF FRONT RADIUS ROD
WELD
SIDE VIEW
5"
REAR RADIUS ROD ANCHOR BOLTS
MAKE FOUR OF STEEL, BEND AND WELD AS SHOWN
1/8"
7/16"
CUT-OUT
1/2"
.652"
5/8"
2"
1"
7 1/2"
TOP VIEW
WELD ANCHOR BOLTS TO TUBING
16 1/2
DETAIL OF REAR RADIUS ROD
3 5/16"
SIDE VIEW
3/4" 18 GA. TUBING



baby-auto fans who have already started building the "Arlen Special," no further introduction to this unique front-drive racer is necessary. And now to continue with the actual building.

You have probably assembled the car as you made each part. Now here's a way to make the front-end assembly: Since the car is a front-drive and the motor is mounted backward, you must turn the differential upside down, so the ring gear will be on the left side. If you don't, imagine your embarrassment when you find that the car runs backward! After attaching the differential, bolt the radius rods to the front axle, and fasten the ball joints to the side rails. Then, install the spring shackles.

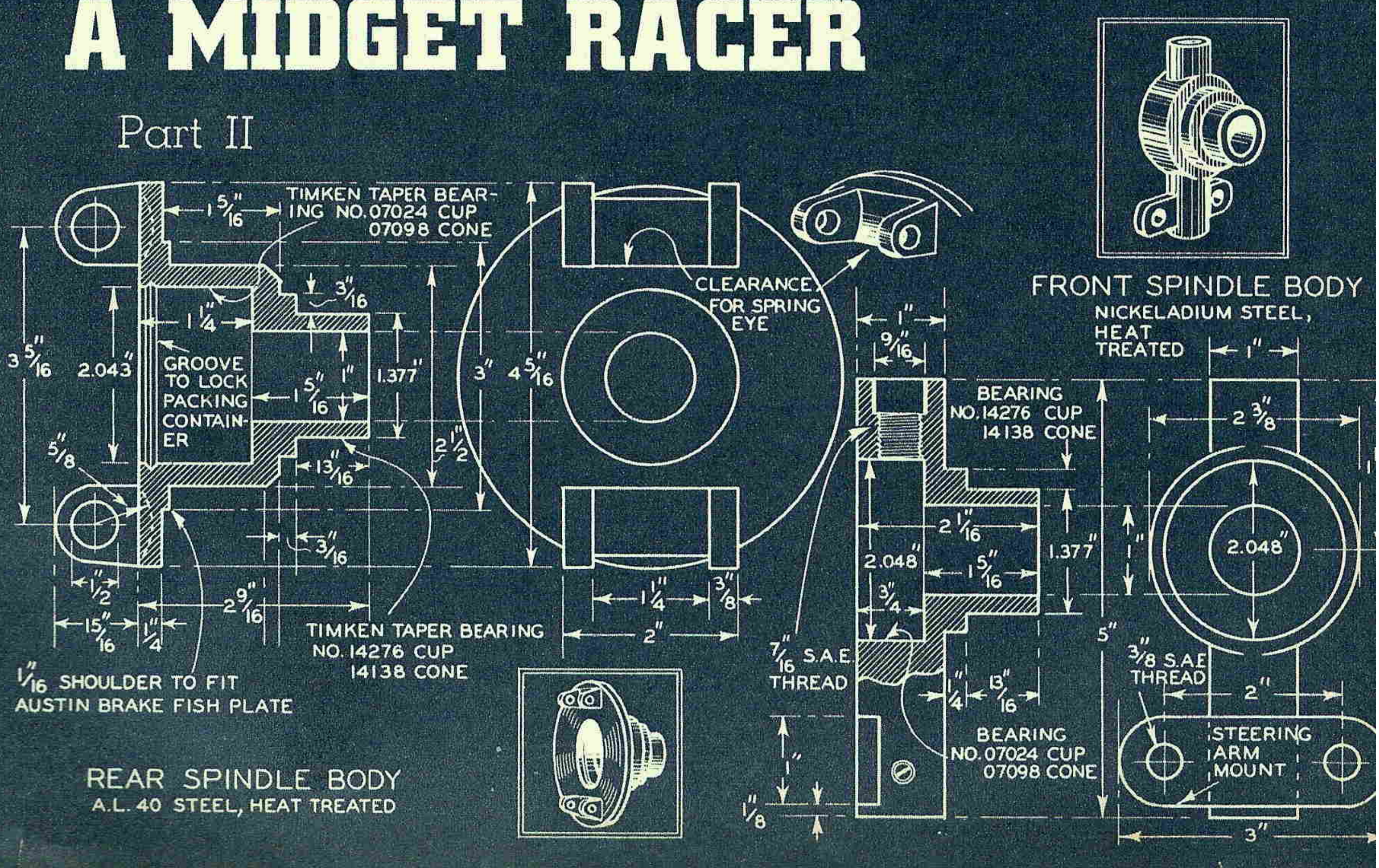
Now take the spindle shafts, to which the "U" joints are welded, and put them through the front spindle bodies, it being assumed that the bearings are in place. Put the keys in, and slip the front hubs on the shafts, screwing on the nuts and locking them with cotter pins. Bolt on the steering arms. Insert the large splined end of the coupler shafts into the sleeves in the differential. Then, slip the splined part of the universal joints over the outer end of the shafts, and install the spindle-body king-bolts. Finally, attach the tie-rod and drag link.

Left—Front radius rods are formed from 3/4"-18 gauge steel tubing, rigidly welded. The ends are flattened and drilled for fastening to front axle. The rear rods are made in a like manner except that anchor bolts are welded in the ends. Spindle body details appear below.

Regarding the front wheel setting, it has already been mentioned that the caster is 2 degrees, which has been taken care of, and

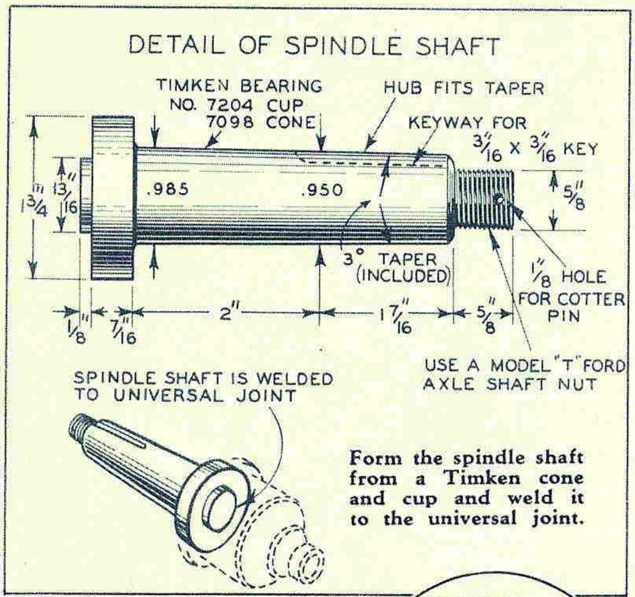
A MIDGET RACER

Part II


TIMKEN TAPER BEARING NO. 07024 CUP 07098 CONE
1 5/16"
3/16"
1 1/4"
3 5/16"
2.043"
GROOVE TO LOCK PACKING CONTAINER
1 5/16"
1"
1.377"
3"
4 5/16"
2 1/2"
5/8"
13/16"
3/16"
1/2"
2 9/16"
15/16"
1/4"
1 1/4"
3/8"
2"
TIMKEN TAPER BEARING NO. 14276 CUP 14138 CONE
1/16" SHOULDER TO FIT AUSTIN BRAKE FISH PLATE
CLEARANCE FOR SPRING EYE
1"
9/16"
BEARING NO. 14276 CUP 14138 CONE
2 1/16"
2.048"
1 5/16"
1.377"
3/4"
7/16 S.A.E. THREAD
1/4"
13/16"
1"
1/8"
BEARING NO. 07024 CUP 07098 CONE
5"
1"
2 3/8"
1"
2.048"
3/8 S.A.E THREAD
2"
STEERING ARM MOUNT
3"

REAR SPINDLE BODY
A.L. 40 STEEL, HEAT TREATED

FRONT SPINDLE BODY
NICKELADIUM STEEL, HEAT TREATED


DETAIL OF SPINDLE SHAFT
TIMKEN BEARING NO. 7204 CUP 7098 CONE
HUB FITS TAPER
KEYWAY FOR 3/16" x 3/16" KEY
.985
.950
1 3/4"
13/16"
5/8"
3° TAPER (INCLUDED)
1/8" HOLE FOR COTTER PIN
1/8"
7/16"
2"
1 7/16"
5/8"
USE A MODEL "T" FORD AXLE SHAFT NUT
SPINDLE SHAFT IS WELDED TO UNIVERSAL JOINT

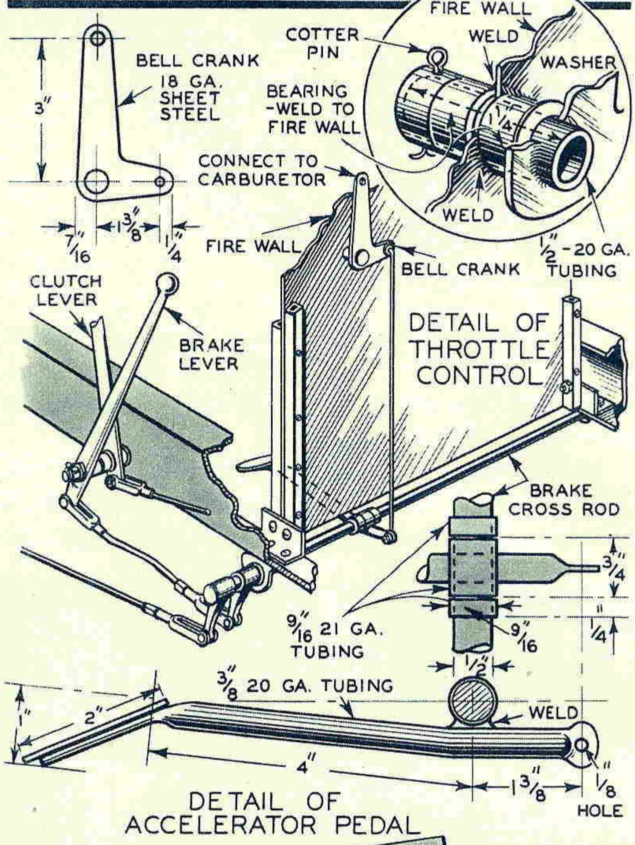
Form the spindle shaft from a Timken cone and cup and weld it to the universal joint.

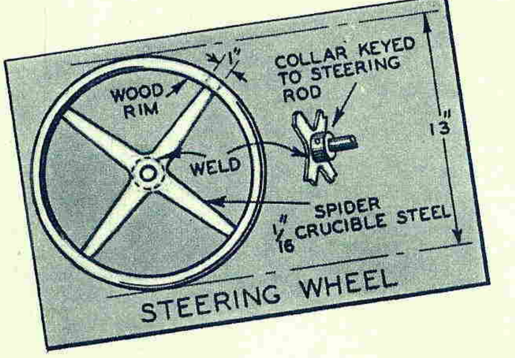
the camber is zero. Toe-in is 1/8", taken care of by the bend in the steering arms. It is highly important to get the toe-in and caster correct. If they're not, the car will wander all over the road at ordinary speeds. And at high speed, it would act dangerously, possibly getting completely out of control.

Make the front radius rods from 3/4" x 18 gauge steel tubing, welded, with a fish-mouth joint, to the ball-socket ends of a Chevrolet drag link. Flatten and drill the ends for the 1/2" anchor bolts by which they are fastened to the front axle. The balls must be located on the side rails in the correct position to give the proper caster setting to the front axle, which is 2 degrees. All large garages have instruments for checking up on this setting. If you'll locate the balls with their center 1 3/8" above the bottom of the side rails, the setting will be correct.

The steering gear bracket is cast from bronze or aluminum, or iron. A 1925 Chevrolet steering gear should be used. It is dis-assembled, the large end of the housing placed in a lathe chuck and the other end turned down to 1 3/8" diameter for a length of 1 1/2". This part should fit tightly in the mounting bracket, with the shoulder against the inside, when bolted to the left side rail. Shorten the steering rod to the proper length and make the steering wheel, which is 13" in diameter. The spider is made from 1/16" thick crucible steel, or the spider of a large wheel is cut down.

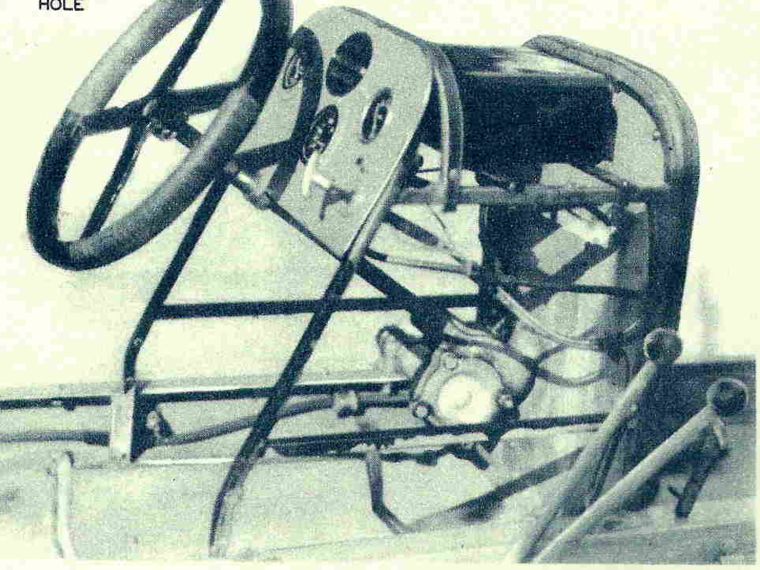
Any pattern-maker can make the wood rim. It should be bound with friction

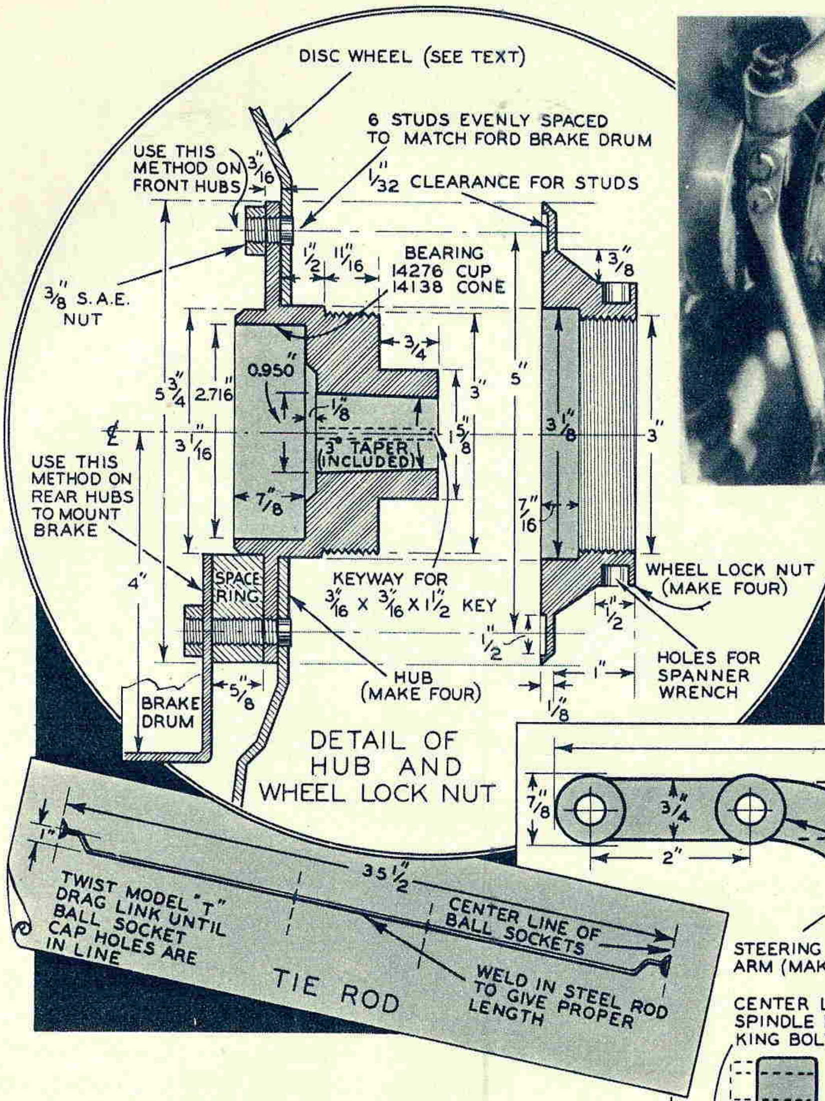

BELL CRANK 18 GA. SHEET STEEL
3"
7/16"
1 3/8"
1/4"
COTTER PIN
FIRE WALL
WELD
WASHER
BEARING -WELD TO FIRE WALL
1/4
WELD
CONNECT TO CARBURETOR
FIRE WALL
BELL CRANK
1/2"-20 GA. TUBING
CLUTCH LEVER
BRAKE LEVER
DETAIL OF THROTTLE CONTROL
BRAKE CROSS ROD
3/4"
9/16" 21 GA. TUBING
9/16"
1/4"
1/2"
3/8" 20 GA. TUBING
WELD
1"
2"
4"
1 3/8"
1/8" HOLE
DETAIL OF ACCELERATOR PEDAL


WOOD RIM
1"
COLLAR KEYED TO STEERING ROD
13"
WELD
SPIDER 1/16" CRUCIBLE STEEL
STEERING WHEEL

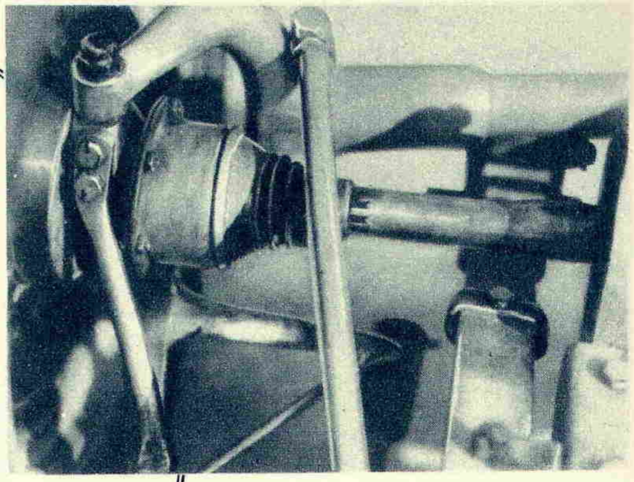
The center illustration shows the method of installing the throttle pedal on the brake cross-rod. Two 9/16" bushings hold it in position. Make steering wheel as shown above.

The cowl frame, pictured here, is shaped from 1/2"-20 gauge square tubing. The dash panel is aluminum and fitted with spark control, oil gauge, tachometer, air gauge, Fahrenheit gauge and A. A. A. seal.




DISC WHEEL (SEE TEXT)
6 STUDS EVENLY SPACED TO MATCH FORD BRAKE DRUM
USE THIS METHOD ON FRONT HUBS
3/16
1/32 CLEARANCE FOR STUDS
3/8 S.A.E. NUT
1/2"
11/16"
BEARING 14276 CUP 14138 CONE
3/8"
3/4
0.950"
5 3/4
2.716
1/8
3"
5"
3"
1 5/8
3 1/8
3 1/16
3° TAPER (INCLUDED)
USE THIS METHOD ON REAR HUBS TO MOUNT BRAKE
7/8"
7/16"
4"
SPACE RING
KEYWAY FOR 3/16 X 3/16 X 1 1/2 KEY
WHEEL LOCK NUT (MAKE FOUR)
1/2"
1/2"
HUB (MAKE FOUR)
1"
HOLES FOR SPANNER WRENCH
BRAKE DRUM
5/8
1/8"
DETAIL OF HUB AND WHEEL LOCK NUT
1"
35 1/2"
TWIST MODEL "T" DRAG LINK UNTIL BALL SOCKET CAP HOLES ARE IN LINE
CENTER LINE OF BALL SOCKETS
WELD IN STEEL ROD TO GIVE PROPER LENGTH
TIE ROD

Detail of hub and wheel lock nut are described above. Brake drums are salvaged from a 1925 Ford to form the novel disc wheel assembly. Rims are drop-center airplane type for 20x4 tires.



This close-up view describes, better than words, the assembly of the front drive wheel mechanism. The hub, spindle body, axle, king-bolt, universal joint, coupler shaft, spring leaf and radius rod can be distinguished in their respective positions.

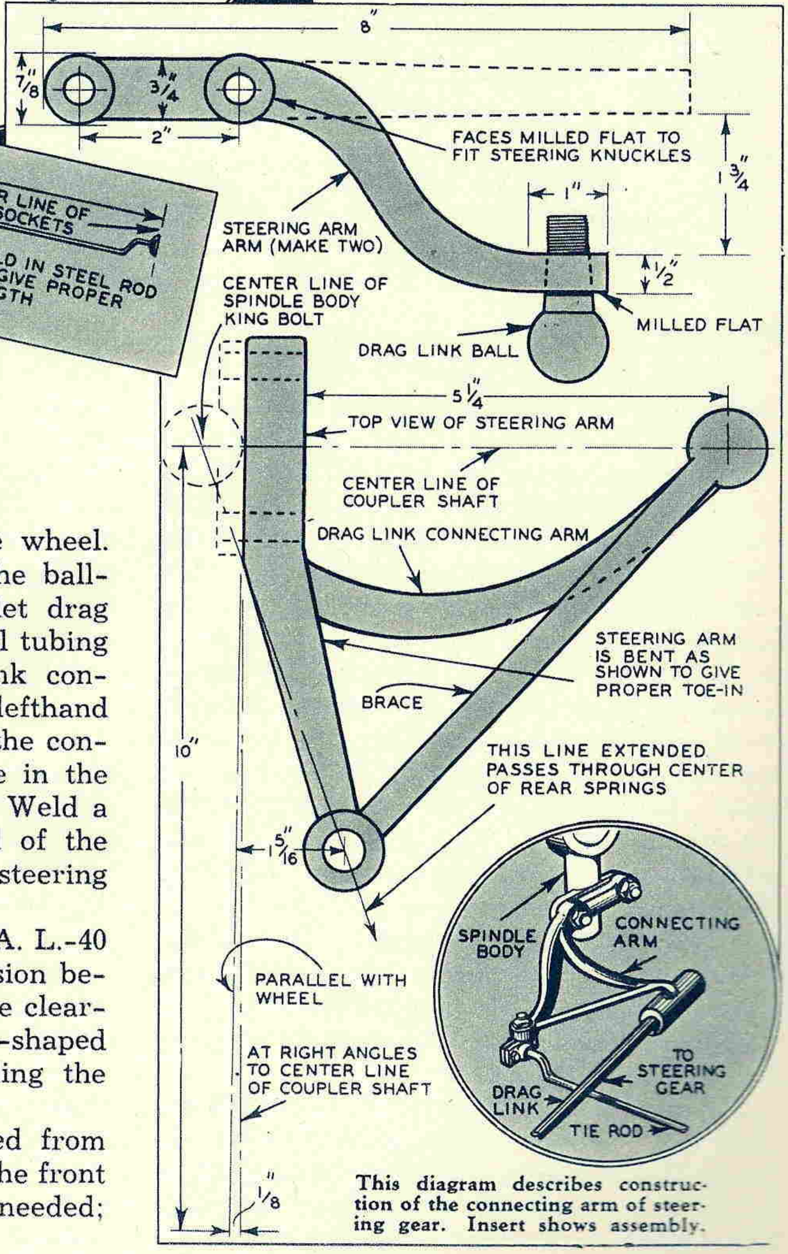
tape where the hands will grip the wheel.

Make the drag link by welding the ball-socket ends of the regular Chevrolet drag link to a piece of 3/4″ x 18 gauge steel tubing of the proper length. The drag link connecting arm, electric-welded to the lefthand steering arm, is made by cutting off the connecting arm of a Chevrolet or made in the same manner as the steering arms. Weld a 3/8″ steel rod between the ball end of the connecting arm and the one on the steering arm, forcing a triangular brace.

Rear spindle bodies are cast from A. L.-40 steel, heat-treated. Note the depression between the anchor-bolt eyes to provide clearance for the spring eyes; also the "V"-shaped grooves around the inside for holding the felt-packing retainer.

The rear spindle shafts are turned from chrome-vanadium steel and are like the front ones except the large flange isn't needed;

[*Continued on page* 124]

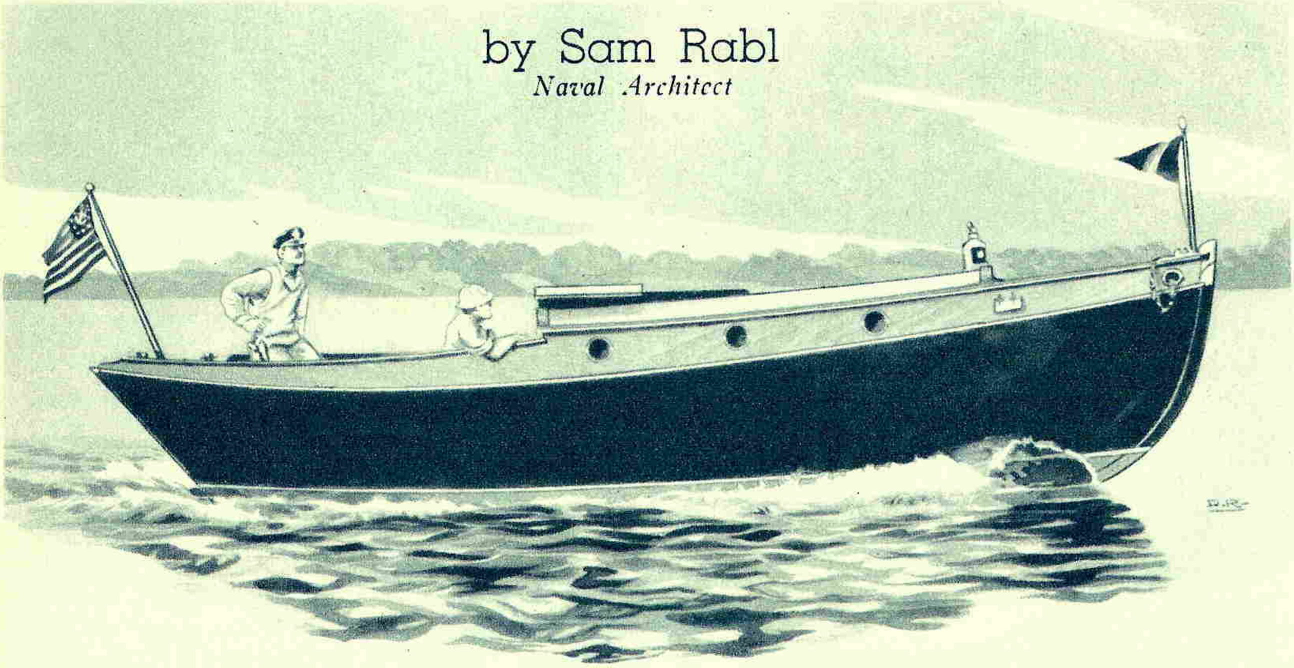

8"
7/8
3/4"
2"
FACES MILLED FLAT TO FIT STEERING KNUCKLES
1 3/4"
1"
STEERING ARM ARM (MAKE TWO)
1/2"
CENTER LINE OF SPINDLE BODY KING BOLT
MILLED FLAT
DRAG LINK BALL
5 1/4"
TOP VIEW OF STEERING ARM
CENTER LINE OF COUPLER SHAFT
DRAG LINK CONNECTING ARM
STEERING ARM IS BENT AS SHOWN TO GIVE PROPER TOE-IN
BRACE
10"
THIS LINE EXTENDED PASSES THROUGH CENTER OF REAR SPRINGS
1 5/16"
SPINDLE BODY
CONNECTING ARM
PARALLEL WITH WHEEL
AT RIGHT ANGLES TO CENTER LINE OF COUPLER SHAFT
TO STEERING GEAR
DRAG LINK
TIE ROD
1/8"

This diagram describes construction of the connecting arm of steering gear. Insert shows assembly.

Rigging and Painting

by Sam Rabl

Naval Architect



Flying Cloud is so designed that it can be used either as a sailing craft or motor cruiser. When used as a motor cruiser the keel should be reduced as described in the text. Power is supplied by a marine auto conversion such as described on pages 106 and 107.

PART III

WITH the major parts of the hull complete, the fittings may be installed. The chain plates to take the shrouds must be installed before the sheer moulding is in place. The freezing port in the bow well should be cut in and covered with a door of the same material as the raised sheer planking and arranged to swing out so that it will spill water should a wave come over the bow. The companion slide and cover can next be fitted as shown on the plans. A strip of copper should be used to cover the joint on the forward end, or many of popular weather-strip sections on the market may be used at this point. Before the interior woodwork is fitted the drains from the cabin top should be constructed of one-inch lead pipe set as close to the cover board corners at the after end of the cabin as space will permit. The cockpit drains should be made from the same material with a leather flap tacked over their overboard ends to prevent a wave from working back into the cockpit.

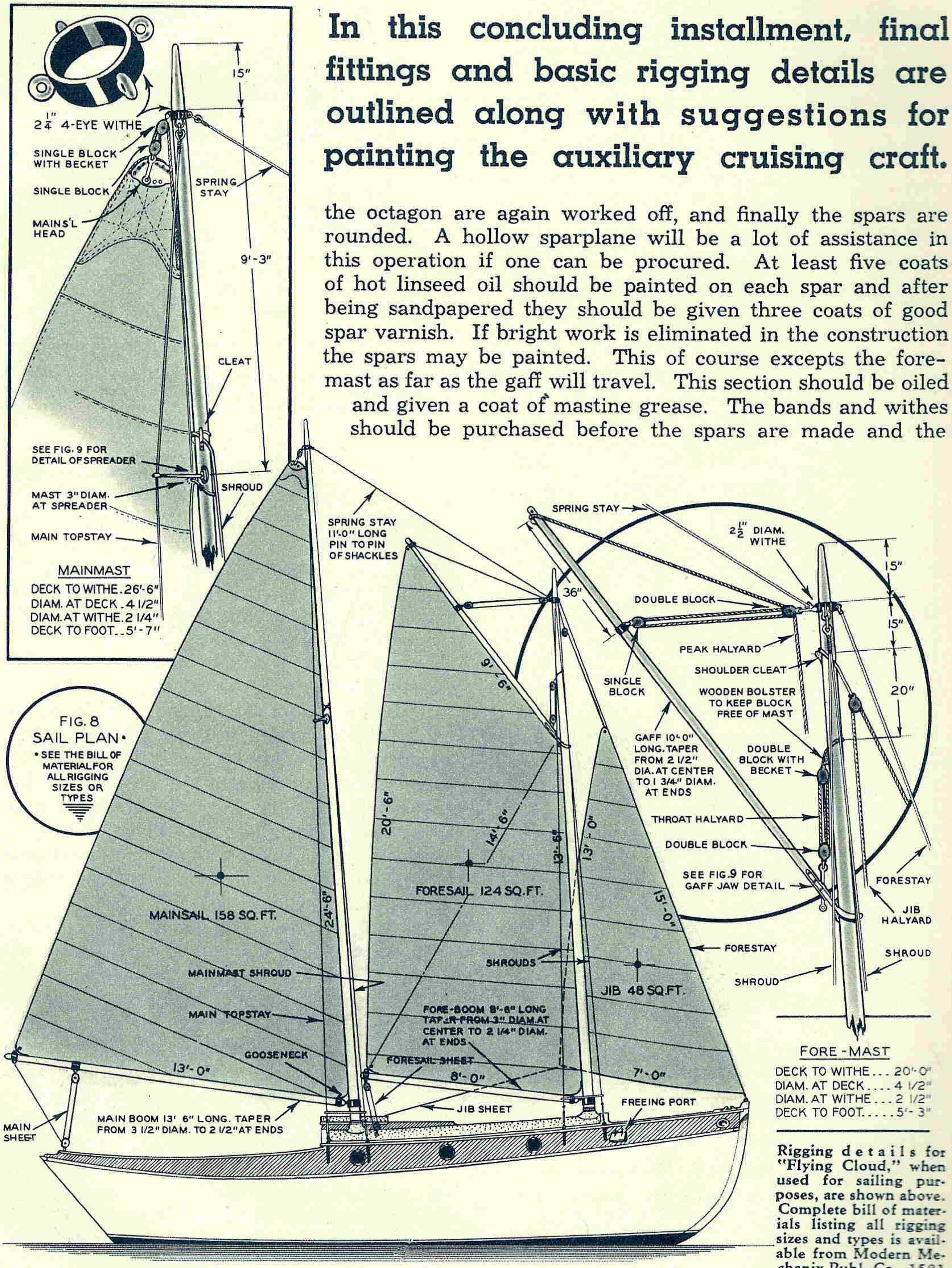
The rudder is constructed of steel or brass plate with the stock of the same material. If the rudder is of brass, its thickness should be ¼" and the stock of 1¾" diameter material. The rudder stock is slotted and brazed to the plate as is also the short stub at the bottom of the rudder which forms a pivot through a hole bored in the returned end of the rudder shoe which should be of ½" brass, three inches wide. If the rudder is to be of steel plate, the stock will be of cold rolled steel bar electrically welded to the blade. The shoe will then be of steel also and the whole assembly galvanized after welding. The rudder stock is carried through the hull, inside of a piece of brass pipe or galvanized pipe to correspond with rudder metal, screwed into a proper size hole in the stern knee. At the top of the stock there should be fitted a tiller or quadrant, which in turn is connected to the drum of the steering wheel with flexible steel cable. Should the builder so desire a hand tiller may be fitted, in which case the stock is carried up through the after deck. As there will be a reversing gear fitted to the motor, some means will have to be arranged to positively stop the rudder from turning any further than thirty-five degrees each side of the centerline.

The spars may now be constructed from Oregon pine or spruce. They are first worked square with all the proper tapers incorporated. After the spars are squared and all humps worked off of their surface they are again worked to an octagon shape. The corners of

COMPLETE "Flying Cloud"

In this concluding installment, final fittings and basic rigging details are outlined along with suggestions for painting the auxiliary cruising craft.

the octagon are again worked off, and finally the spars are rounded. A hollow sparplane will be a lot of assistance in this operation if one can be procured. At least five coats of hot linseed oil should be painted on each spar and after being sandpapered they should be given three coats of good spar varnish. If bright work is eliminated in the construction the spars may be painted. This of course excepts the foremast as far as the gaff will travel. This section should be oiled and given a coat of mastine grease. The bands and withes should be purchased before the spars are made and the


2 1/4" 4-EYE WITHE
15"
SINGLE BLOCK WITH BECKET
SINGLE BLOCK
SPRING STAY
MAINS'L HEAD
9'-3"
CLEAT
SEE FIG. 9 FOR DETAIL OF SPREADER
MAST 3" DIAM. AT SPREADER
SHROUD
MAIN TOPSTAY
MAINMAST
DECK TO WITHE. 26'-6"
DIAM. AT DECK. 4 1/2"
DIAM. AT WITHE. 2 1/4"
DECK TO FOOT. 5'-7"
FIG. 8
SAIL PLAN •
• SEE THE BILL OF MATERIAL FOR ALL RIGGING SIZES OR TYPES
SPRING STAY 11'-0" LONG PIN TO PIN OF SHACKLES
9'-6"
36"
20'-6"
14'-6"
13'-6"
13'-0"
15'-0"
24'-6"
MAINSAIL 158 SQ. FT.
FORESAIL 124 SQ. FT.
JIB 48 SQ. FT.
SHROUDS
FORESTAY
MAINMAST SHROUD
MAIN TOPSTAY
FORE-BOOM 8'-6" LONG TAPER FROM 3" DIAM. AT CENTER TO 2 1/4" DIAM. AT ENDS
GOOSENECK
FORESAIL SHEET
13'-0"
8'-0"
7'-0"
JIB SHEET
FREEING PORT
MAIN SHEET
MAIN BOOM 13' 6" LONG. TAPER FROM 3 1/2" DIAM. TO 2 1/2" AT ENDS
SPRING STAY
2 1/2" DIAM. WITHE
15"
15"
20"
DOUBLE BLOCK
PEAK HALYARD
SHOULDER CLEAT
SINGLE BLOCK
WOODEN BOLSTER TO KEEP BLOCK FREE OF MAST
GAFF 10'-0" LONG. TAPER FROM 2 1/2" DIA. AT CENTER TO 1 3/4" DIAM. AT ENDS
DOUBLE BLOCK WITH BECKET
THROAT HALYARD
DOUBLE BLOCK
SEE FIG. 9 FOR GAFF JAW DETAIL
FORESTAY
JIB HALYARD
SHROUD
SHROUD
FORE-MAST
DECK TO WITHE... 20'-0"
DIAM. AT DECK.... 4 1/2"
DIAM. AT WITHE... 2 1/2"
DECK TO FOOT..... 5'-3"

Rigging details for "Flying Cloud," when used for sailing purposes, are shown above. Complete bill of materials listing all rigging sizes and types is available from Modern Mechanix Publ. Co., 1501 Broadway, N. Y. C.

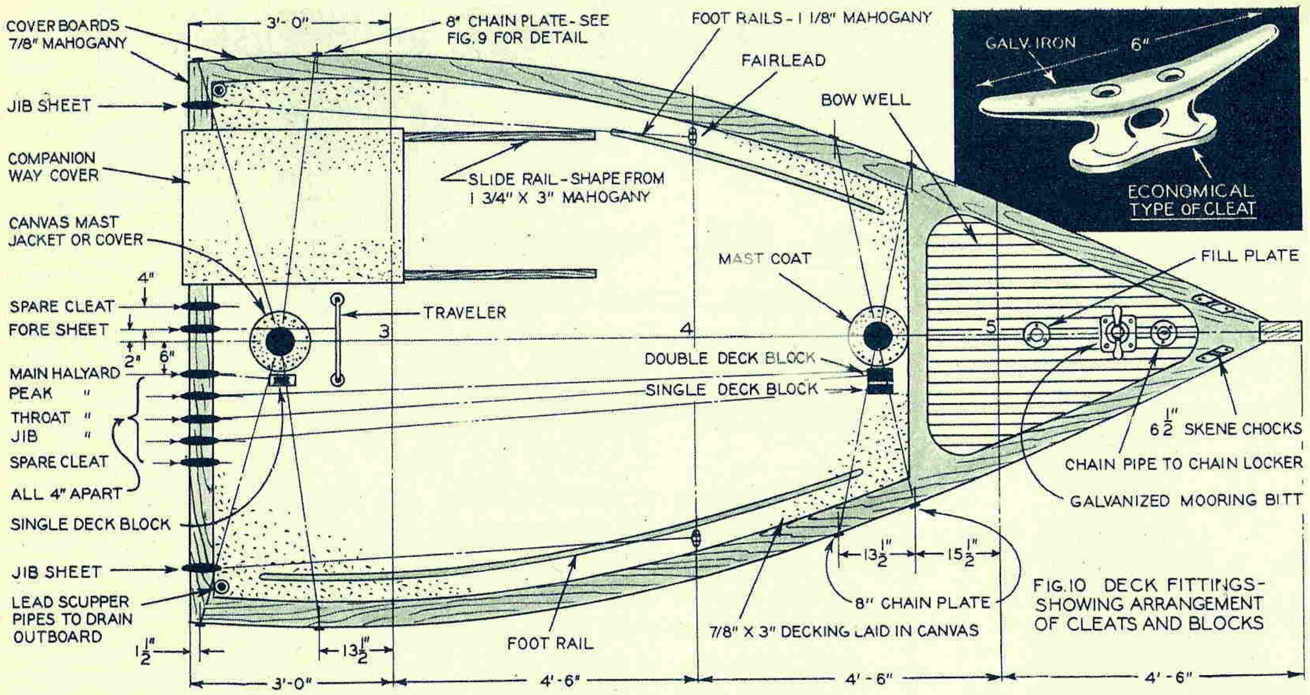

COVER BOARDS 7/8" MAHOGANY
3'-0"
8" CHAIN PLATE - SEE FIG. 9 FOR DETAIL
FOOT RAILS - 1 1/8" MAHOGANY
FAIRLEAD
BOW WELL
GALV. IRON
6"
ECONOMICAL TYPE OF CLEAT
JIB SHEET
COMPANION WAY COVER
SLIDE RAIL - SHAPE FROM 1 3/4" X 3" MAHOGANY
CANVAS MAST JACKET OR COVER
MAST COAT
FILL PLATE
4"
SPARE CLEAT
FORE SHEET
TRAVELER
3
4
5
2"
6"
MAIN HALYARD
PEAK "
THROAT "
JIB "
SPARE CLEAT
ALL 4" APART
DOUBLE DECK BLOCK
SINGLE DECK BLOCK
6 1/2" SKENE CHOCKS
CHAIN PIPE TO CHAIN LOCKER
GALVANIZED MOORING BITT
SINGLE DECK BLOCK
JIB SHEET
LEAD SCUPPER PIPES TO DRAIN OUTBOARD
13 1/2"
15 1/2"
8" CHAIN PLATE
7/8" X 3" DECKING LAID IN CANVAS
FOOT RAIL
1 1/2"
13 1/2"
3'-0"
4'-6"
4'-6"
4'-6"

FIG. 10 DECK FITTINGS-SHOWING ARRANGEMENT OF CLEATS AND BLOCKS

Successful rigging depends largely upon the proper placement of cleats and blocks. This deck plan makes clear the proper arrangement of these vital fittings.

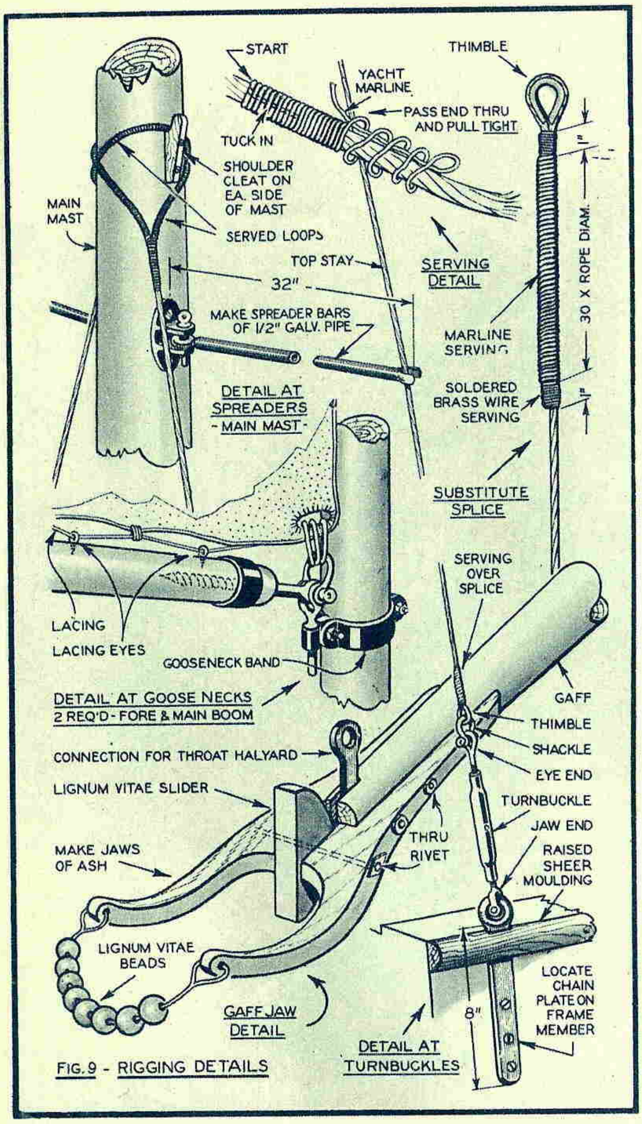

START
THIMBLE
YACHT MARLINE
PASS END THRU AND PULL TIGHT
TUCK IN
1"
SHOULDER CLEAT ON EA. SIDE OF MAST
MAIN MAST
SERVED LOOPS
TOP STAY
SERVING DETAIL
32"
30 X ROPE DIAM.
MAKE SPREADER BARS OF 1/2" GALV. PIPE
MARLINE SERVING
DETAIL AT SPREADERS - MAIN MAST -
SOLDERED BRASS WIRE SERVING
1"
SUBSTITUTE SPLICE
SERVING OVER SPLICE
LACING
LACING EYES
GOOSENECK BAND
DETAIL AT GOOSE NECKS 2 REQ'D - FORE & MAIN BOOM
GAFF
THIMBLE
SHACKLE
EYE END
CONNECTION FOR THROAT HALYARD
LIGNUM VITAE SLIDER
TURNBUCKLE
JAW END
THRU RIVET
MAKE JAWS OF ASH
RAISED SHEER MOULDING
LIGNUM VITAE BEADS
LOCATE CHAIN PLATE ON FRAME MEMBER
8"
GAFF JAW DETAIL
DETAIL AT TURNBUCKLES

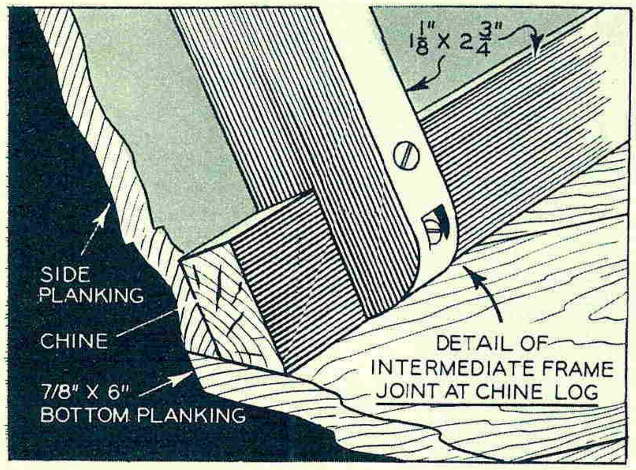
FIG. 9 - RIGGING DETAILS

Any blacksmith will fashion these rigging fittings at a nominal cost or they can be purchased ready made from any boat builder's supply house. Spars are shaped from Oregon pine or spruce and treated with at least five coats of hot linseed oil except for the foremast, as far as gaff travels, which is oiled.

spar worked to a diameter a little larger than the band at the point where the band is to be located. On the masts it is good practice to allow a shoulder at least an eighth inch larger than the band so that the band will not slip down the mast when the turnbuckles are set up. At points where the blocks or stays are looped around the mast, shoulder cleats of hardwood should be fitted. These cleats should be slightly mortised in the mast so that they will not put all of the load on the screws attaching them to the masts. The foremast should have a thin brass plate attached at the point where the gaff will swing so as to eliminate wear on the spar at this point. This plate should be carried at least three-quarters around the mast and fastened with escutcheon pins. The center-line of the plate will face aft.

The wire rope rigging should now be made with all ends aloft spliced or looped as required. Splicing is highly recommended as it will give the rigging a professional look. In event of the builder being unable to splice wire rope it may be turned back on itself and served and soldered as shown. All loops wherever fitted should be served with Italian yacht marline to prevent wear on the metal and improve its appearance. After the spars are stepped the lower ends of the shrouds and stays are spliced to the correct length to fit the turnbuckles when they are three-quarters open. This allows them to be set up properly. No wire should be tightened beyond the point at which it is reasonably taut so as not to set up undue strains in the hull and spars. Be sure that all manila ropes are rove and all blocks shackled or set in their proper places before the spars are sent aloft. All ends of manila line on the boat should be securely served with sail twine waxed with beeswax so that they will not fray out. Here the builder will be able to show his marline-spike seamanship by producing work that the old sailors loved to term "ship-shape and Bristol fashion."

The sails should be of six-ounce canvas and provided with sail covers as the foresail will not be convenient to remove after every run. Khaki sails look well on this type of yacht, especially so if the hull is finished in a dark shade. The sails should be thoroughly reinforced in all corners and the mainsail should be fitted with sail battens. As the sails are in this case auxiliary to the motor they need not be constructed with the precision that is required of racing sails. Strength rather than shape should be the rule. The sails are laced to both main and fore boom with lacing eyes as shown. All halyards and sheets should be led to the end of the raised deck and belayed on cleats as shown on the deck plan. The locations of these leads should be memorized so that even on the darkest night, in sailors' lingo, you will "know the ropes." While ordering the running rigging it may be well to include two mooring lines of ¾" manila, twenty feet long, which should be neatly eye-spliced on one end. The free end should be seized or served.

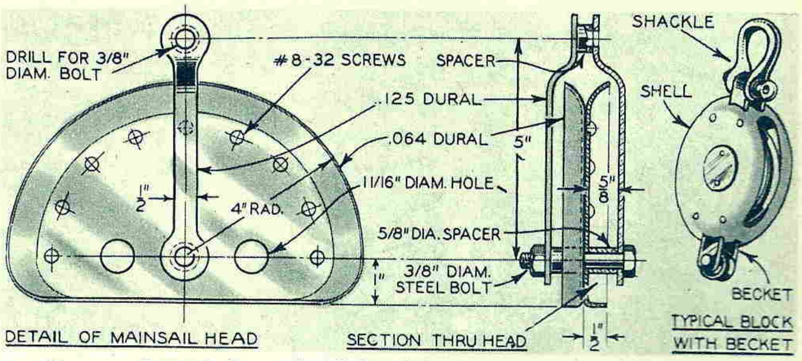

$1\frac{1}{8}'' \times 2\frac{3}{4}''$
SIDE PLANKING
CHINE
7/8" X 6" BOTTOM PLANKING
DETAIL OF INTERMEDIATE FRAME JOINT AT CHINE LOG

No detail plan for the intermediate frame joint at the chine log was given in past installments. The joint construction, though extremely simple, is shown here for convenience.

Flying Cloud's cabin is amply large for bunking several adults or a small family. This craft is designed especially for inland vacation cruises.

With the exterior finished we can turn our attention to its painting and finish. There isn't a prettier job afloat than those whose woodwork is of mahogany finished natural. In connection with this also there are none which occasions more work to keep them looking this way. For the man who has plenty of time and likes to fuss around cleaning varnish and scraping down whenever it is needed, the bright work will have a lot of appeal, but to the man who really wants pleasure afloat I would strongly recommend fisherman finish with all woodwork painted. My own preferences would be a green bottom, black hull and buff decks, with all trim painted white. This of course will not appeal to at least half of the people who build this boat and their preference is respected. In any event secure good marine paints which are the cheapest in the long run. Every coat applied to the hull should be sanded and all seams of the planking puttied flush with a good seam compound.

Completed, "Flying Cloud" will furnish its builder with endless hours of enjoyment such as only the deep blue waters can offer. Careful construction will result in a truly beautiful craft that can be looked upon with pride.

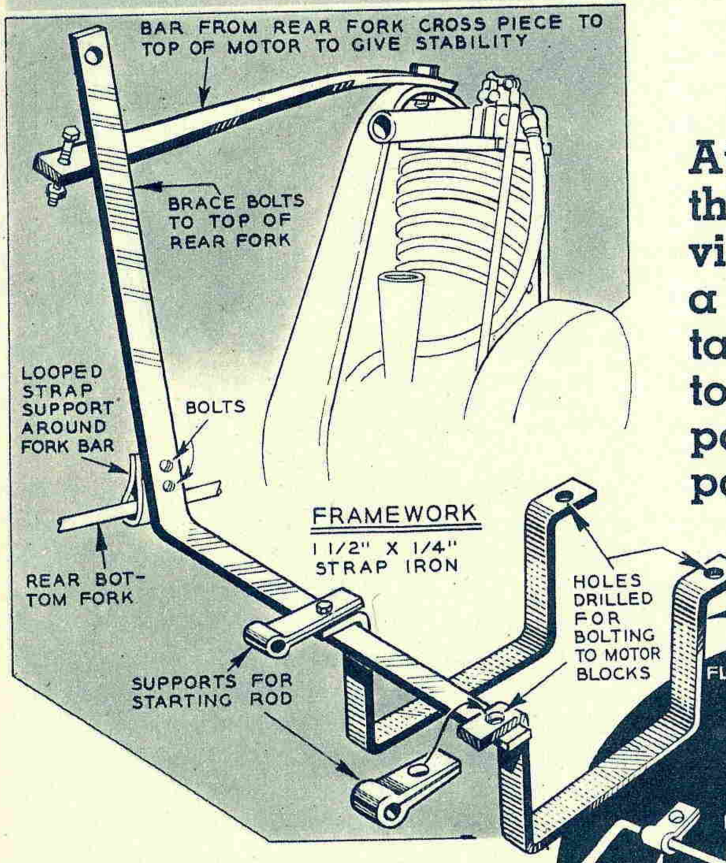


Construction of the mainsail head is described at the left. Dural aluminum is used for the pulley and shackle. A typical block as used in rigging auxiliary cruiser is illustrated at the extreme right.

WASHING MACHINE MOTOR

by M. R. Cullen

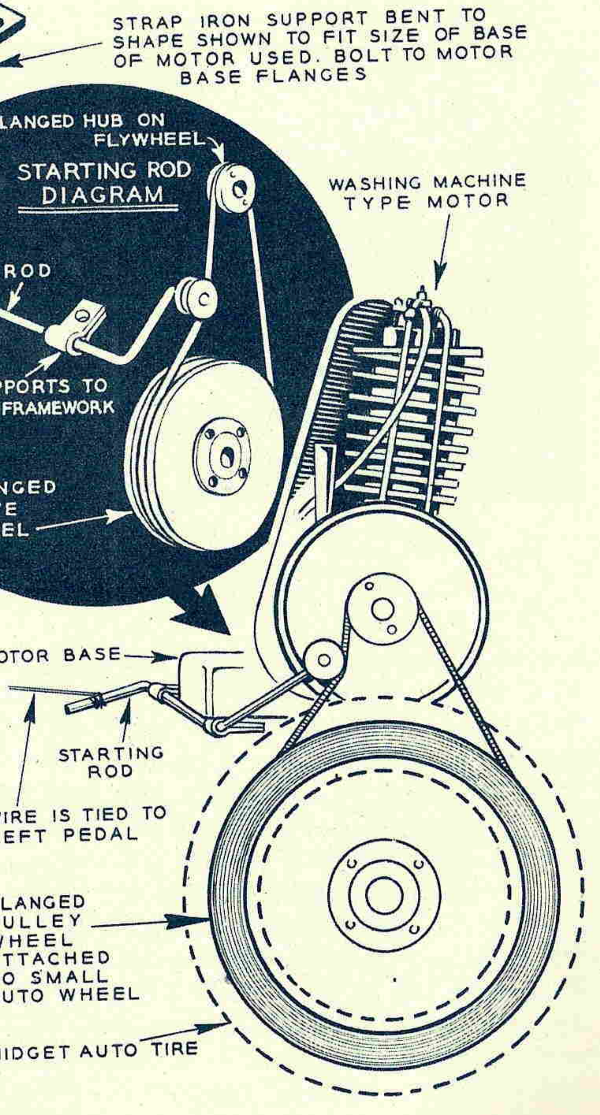
Attachable to any bicycle, this motorized unit provides young cyclists with a novel form of transportation. Speeds ranging up to 15 miles-per-hour are possible on open concrete pavements and highways.


BAR FROM REAR FORK CROSS PIECE TO TOP OF MOTOR TO GIVE STABILITY
BRACE BOLTS TO TOP OF REAR FORK
LOOPED STRAP SUPPORT AROUND FORK BAR
BOLTS
FRAMEWORK
1 1/2" X 1/4" STRAP IRON
REAR BOTTOM FORK
HOLES DRILLED FOR BOLTING TO MOTOR BLOCKS
SUPPORTS FOR STARTING ROD
STRAP IRON SUPPORT BENT TO SHAPE SHOWN TO FIT SIZE OF BASE OF MOTOR USED. BOLT TO MOTOR BASE FLANGES

The motor frame is formed from 1½ by ¼-inch strap iron bent and assembled with machine bolts in the manner shown. No dimensions for frame are given since sizes of bicycles vary.

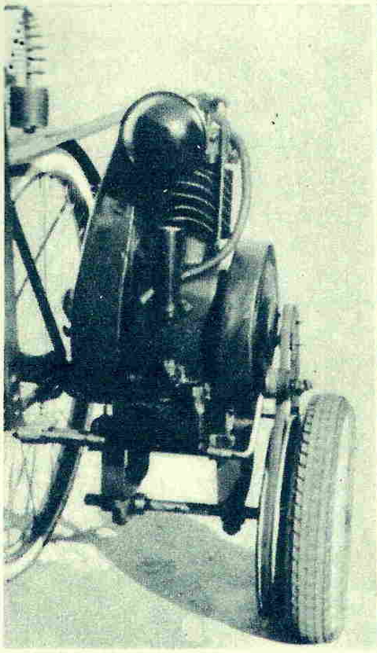
ANY bicycle can be quickly converted into a motorized "tri-bike" to provide new thrills in cycling. Designed especially for young riders the motor attachment converts the bicycle into a tricycle, the power being supplied by a washing machine motor belted to a midget doughnut tired wheel. On concrete pavements the motor attachment is capable of carrying the bicycle along at a maximum speed of 15 miles-per-hour which is amply sufficient. Where the bicycle is used in conjested localities a governor can be attached so as to keep the maximum speed down to about 8 miles-per-hour.

Any standard washing machine motor can be used for supplying the power. Since nearly all of these motors have similar mountings the supporting frame described in the accompanying illustrations can be used with any motor with only slight changes in construction. Slight changes that may be required for the particular motor used will make themselves evident during con-

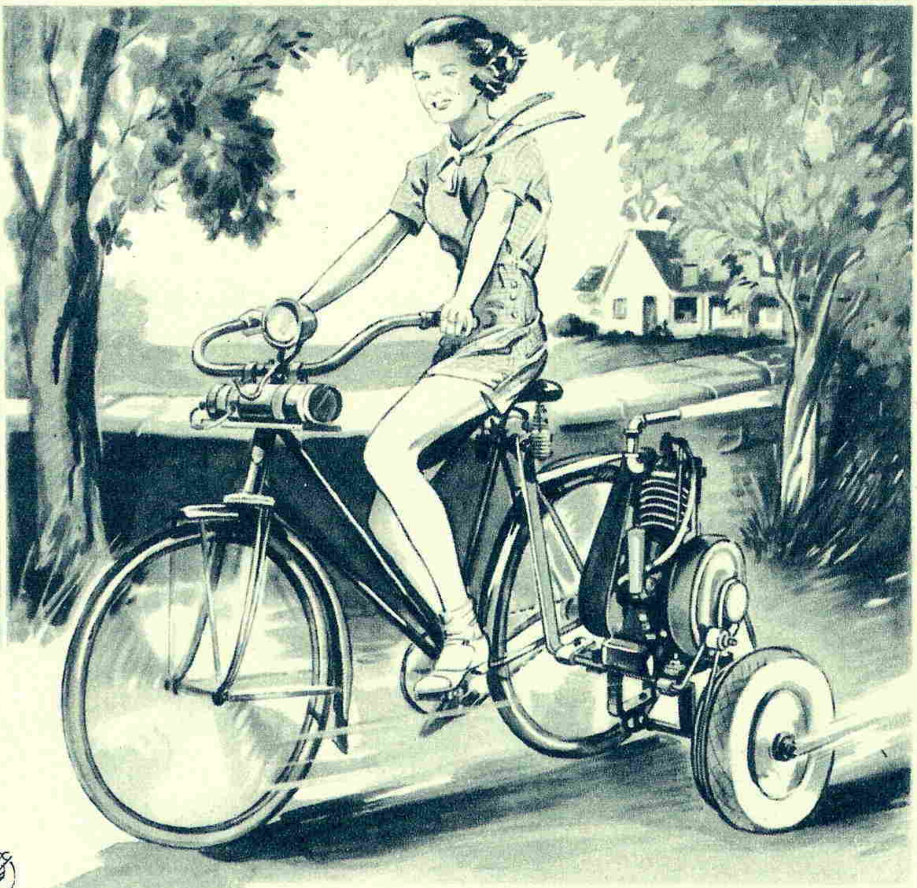

FLANGED HUB ON FLYWHEEL
STARTING ROD DIAGRAM
ROD
LOOPED SUPPORTS TO STRAP IRON FRAMEWORK
FLANGED DRIVE WHEEL
WASHING MACHINE TYPE MOTOR
MOTOR BASE
STARTING ROD
WIRE IS TIED TO LEFT PEDAL
FLANGED PULLEY WHEEL ATTACHED TO SMALL AUTO WHEEL
MIDGET AUTO TIRE

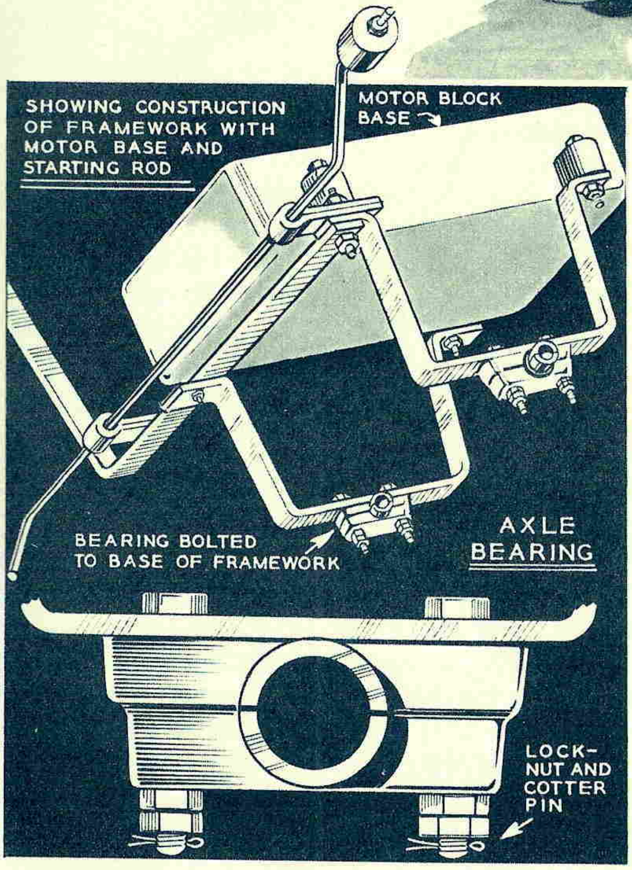
Power is delivered to the doughnut wheel by means of the pulley arrangement described here. The "Tri-bike" is set into motion when the starting rod bar is pressed. The small pulley takes up the slack in the drive belt.

POWERS UNIQUE "TRI-BIKE"



Shown here is a head-on view of the motor unit after being installed on the bicycle. The motor can be started either by pedal or with the kick starter located in the rear.




SHOWING CONSTRUCTION OF FRAMEWORK WITH MOTOR BASE AND STARTING ROD
MOTOR BLOCK BASE
BEARING BOLTED TO BASE OF FRAMEWORK
AXLE BEARING
LOCK-NUT AND COTTER PIN

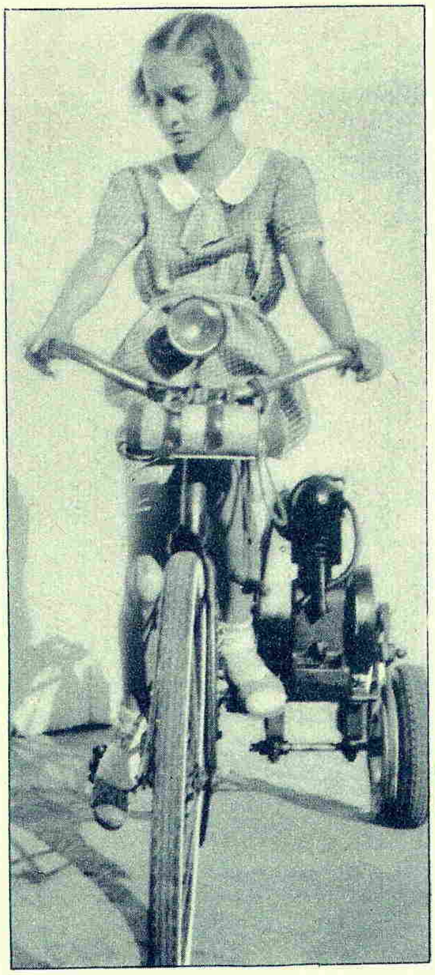
The simplicity of the starting rod and motor frame is made evident in the upper perspective diagrammatical view. Below it is shown the axel bearing assembly which can be fashioned from materials available at any automobile wrecking yard

struction and can be adjusted accordingly.

The motor frame is formed from 1½ by ¼-inch strap iron. No dimensions are given for its construction since its size depends largely upon the bicycle and motor used, as previously mentioned. First form the main "L" support which clamps to the bicycle just under the rider's seat and extends down to a point slightly below the bottom of the rear fork.

The axle supports are made next. These consist of "U" shaped brackets bent as illustrated and fitted with bearings for inserting the axle for the doughnut tired wheel. The "U" brackets are bent to the width of the holes in the base of the motor and the flanges drilled at each end for inserting the mounting bolts. A loop strap is bent around the lower fork and attached to the "L" bracket with a stove bolt so that the assembly is sufficiently rigid. An additional bracing bar is connected from the seat bolt to the top of the motor to further strengthen the motor attachment.

The power take-off is next given consideration. Referring to the accompanying



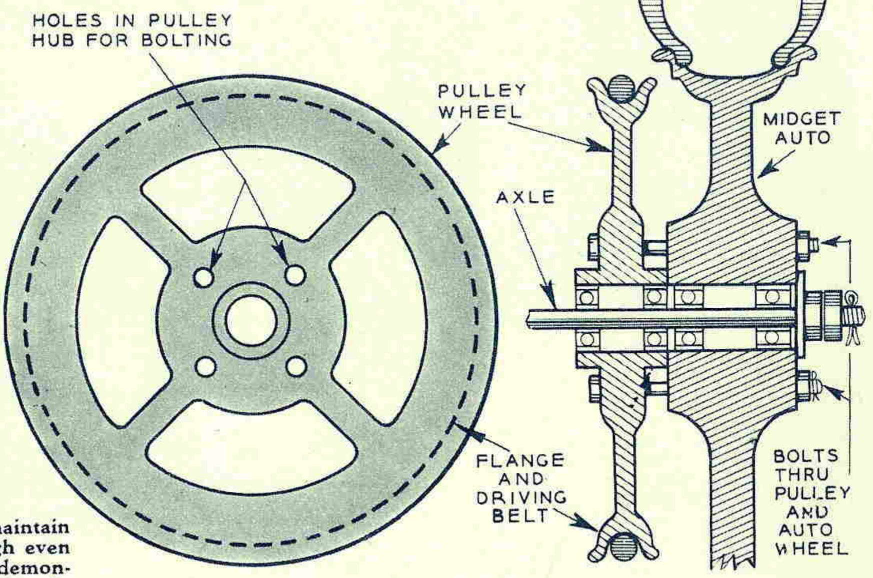
Since it is not necessary for the rider to maintain his balance, the "Tri-bike" is safe enough even for small children. This young lady demonstrates the method of stopping, by applying the coaster brake which releases the tension on the belt as soon as reverse pedal pressure is applied.

illustrations it will be noticed that a friction belt drive is used to transmit power to the doughnut wheel. This necessitates the use of a flanged wheel mounted on the inside of the pneumatic drive wheel for attaching the motor belt.

If the builder has access to a wood turning lathe a satisfactory pulley can be turned from maple or any other hard stock. Otherwise, a manufactured pulley can be used. In order that the belt clears the tire the pulley should be mounted on a metal collar or mounted to the wheel with bushings. A section cut from an old auto generator housing, and tapped so that machine screws can be inserted for fastening the pulley to the wheel, can also be used.

The assembled pulley and wheel are ready for mounting on the axle. The axle fastens to the motor frame "U" brackets with clamps made from a pair of bearings salvaged from an automobile. After inserting the axle draw the bearing bolts tight and insert cotter pins so that vibration of the motor will not cause them to drop off. At this point the frame should be attached to the bicycle and the motor mounted in place so that the proper tension of the belt drive can be determined. A loose fitting belt should be secured and slipped over the motor and wheel pulleys so that the starting rod can be inserted. Form the rod from a length of ⅜-inch iron rod with one end bent crank-shaped and a small wooden roller attached so that when it is installed in a pair of loop straps at the front of the motor frame the roller will push against the belt and take up the slack.

PULLEY AND AUTO WHEEL ASSEMBLY

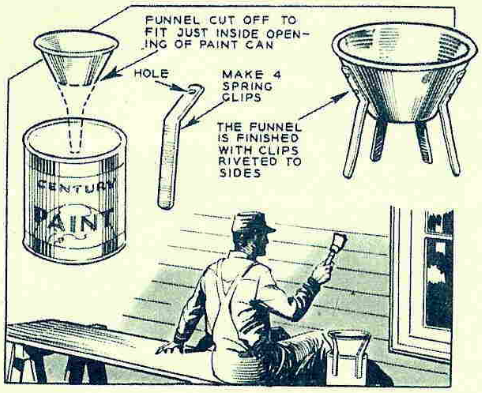

HOLES IN PULLEY HUB FOR BOLTING
PULLEY WHEEL
MIDGET AUTO
AXLE
FLANGE AND DRIVING BELT
BOLTS THRU PULLEY AND AUTO WHEEL

The opposite end of the rod is bent to right angles and a wire attached to it and the left-hand panel so that when tramped upon the wire pulls on the starting rod, forcing the roller against the belt so as to take up the slack and set the motor into operation.

This ingenious arrangement permits the cyclist to apply the brakes instantly without the motor being engaged. As soon as pressure is reversed on the pedal the starting rod releases the tension on the belt and the motor idles until the pedal is drawn forward.

The simple clamp mounting arrangement permits the motor to be removed from the bicycle in a few moments when not desired. Except for the purchase of a doughnut wheel and tire the cost of materials, if a washing machine motor is available, is slight. In most states the "tri-bike" can be operated without a vehicle license. To determine whether or not a license is required in your state write the Motor Vehicle Department.

ABOUT-THE-HOME HANDIKINKS

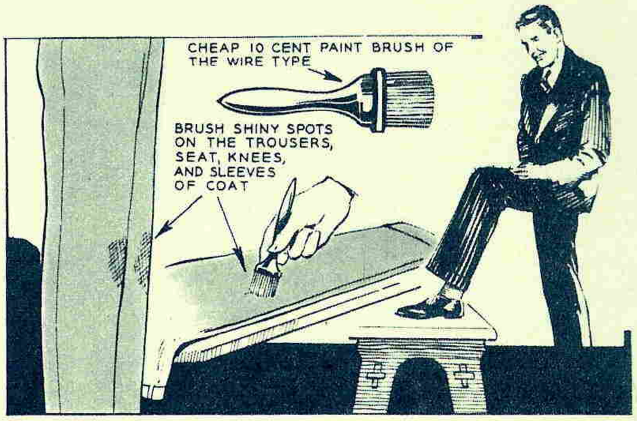

FUNNEL CUT OFF TO FIT JUST INSIDE OPENING OF PAINT CAN
HOLE
MAKE 4 SPRING CLIPS
THE FUNNEL IS FINISHED WITH CLIPS RIVETED TO SIDES
CENTURY
PAINT

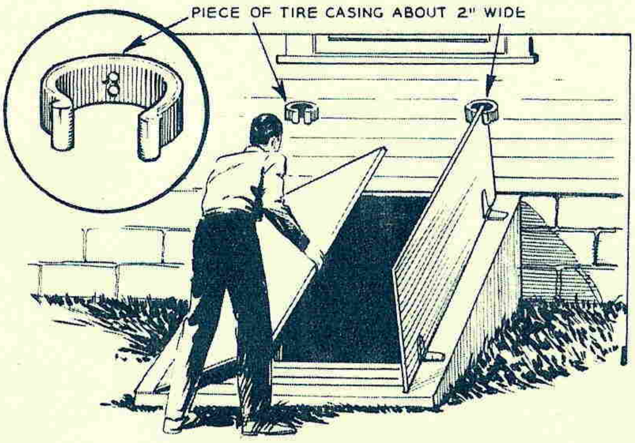
Painting Gadget Made From Funnel

WHEN using paint directly from the original container the continual wiping of the brush bristles across the edge of the can results in paint running over the sides and causing considerable smear. A simple and effective way to eliminate this trouble is to fit the can with the funnel gadget shown. Purchase a cheap tin funnel and cut off the spout so that only the upper portion remains, attach spring slips formed from clock spring to the sides and the device is ready for use. The device will eliminate further can smearing.

Brush Removes Clothes Shine

A WIRE brush, purchasable at any ten cent store, will effectively remove the shine from clothing which otherwise would have to be cast off. Lay the material on a flat board and brush over the shine with light, short strokes. Do not brush the material excessively or the fabric may be damaged by the sharp wire bristles. After completing the brushing operation clean the treated surface with a cloth saturated with benzine.


CHEAP 10 CENT PAINT BRUSH OF THE WIRE TYPE
BRUSH SHINY SPOTS ON THE TROUSERS, SEAT, KNEES, AND SLEEVES OF COAT

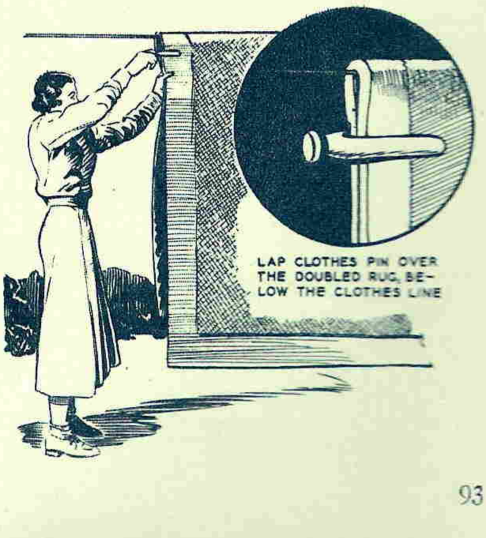

PIECE OF TIRE CASING ABOUT 2" WIDE

Tire Casing Forms Door Check

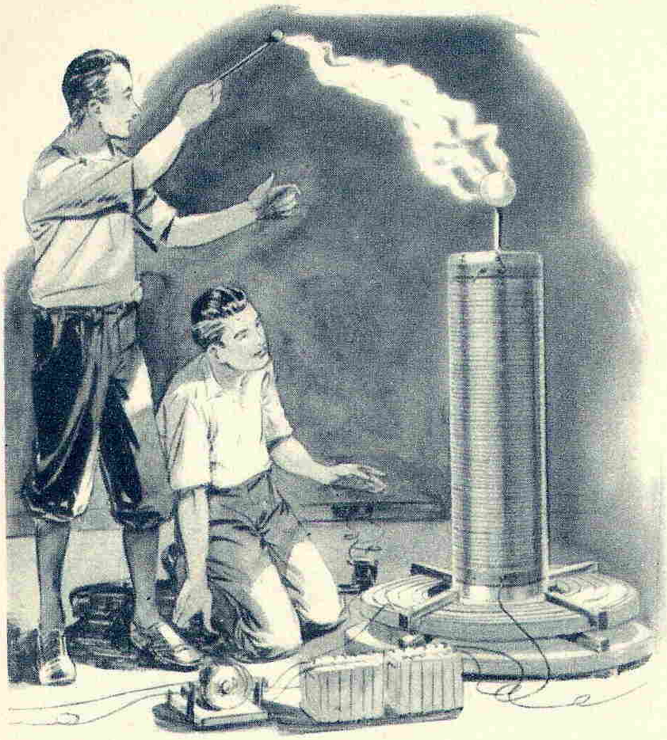
OUTSIDE basement doors that are constantly dropping backward, when opened, and straining the hinges, can be fitted with a pair of tire casing catches which will permanently eliminate this trouble. With a hacksaw, cut two 2-inch sections from an old auto tire casing and mount them to the side of the building with long wood screws or nails. When opened the doors engage in the tire casing catch where they are rigidly held until released.

Clothes Pins Hold Rugs On Line

SIMPLE as it may appear, this rug and blanket cleaning kink will prevent a sudden gust of wind from blowing them from the line when hung out to air. After throwing the covering over the line clip the two sides together with clothes pins as near to the wire as possible. No matter how hard the wind blows, the material will remain on the line without danger of it blowing off on the ground. Housewives usually place the pins over the line, forcing them down over the blanket or rug which results in either the pin breaking or slipping up when the slightest breeze strikes the article being aired.
—A. H. Waychoff.


LAP CLOTHES PIN OVER THE DOUBLED RUG, BELOW THE CLOTHES LINE

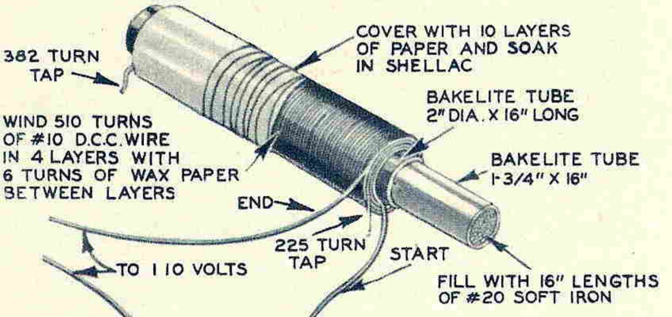
MAKE Artificial LIGHTNING

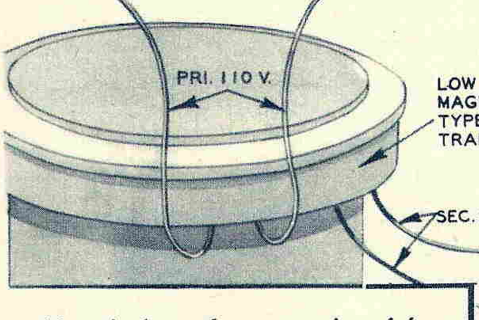


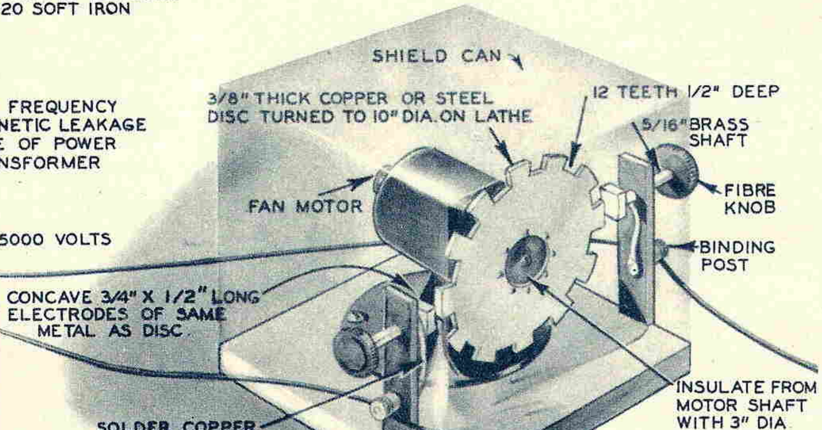
by John L. Welbourn

EDITOR'S NOTE—*This equipment is particularly suited for science class-room demonstrations. At no time should a demonstration be attempted by one unfamiliar with the apparatus. Although the giant brush discharge is harmless to the average person, a shock from any part of the equipment other than the high-frequency transformer will carry with it serious consequences to the person involved. It is suggested that when this apparatus is demonstrated before a group of persons, they be warned not to touch the apparatus and to stand a respectful distance from the low-voltage equipment.*

THE apparatus about to be described is capable of throwing a spark four and a half feet long. In spite of its deadly appearance, this spark is quite harmless. The operator may hold a metal rod in his hand and let it jump to the end of the rod and run through his body to ground, not only without harm, but without any sensation of shock. A rather spectacular stunt is to hold one wire leading to an incandescent light, and bring the other end near the coil. The lamp will be lighted by the current passing through the body and may in a few minutes even be

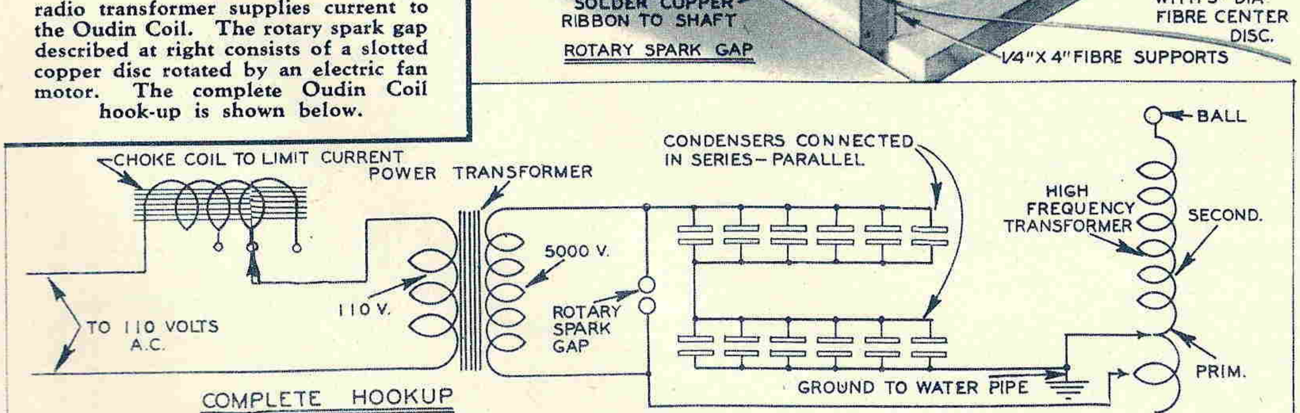

382 TURN TAP
COVER WITH 10 LAYERS OF PAPER AND SOAK IN SHELLAC
BAKELITE TUBE 2" DIA. X 16" LONG
WIND 510 TURNS OF #10 D.C.C. WIRE IN 4 LAYERS WITH 6 TURNS OF WAX PAPER BETWEEN LAYERS
BAKELITE TUBE 1-3/4" X 16"
END
225 TURN TAP
START
TO 110 VOLTS
FILL WITH 16" LENGTHS OF #20 SOFT IRON


PRI. 110 V.
LOW FREQUENCY MAGNETIC LEAKAGE TYPE OF POWER TRANSFORMER
SEC. 5000 VOLTS


SHIELD CAN
3/8" THICK COPPER OR STEEL DISC TURNED TO 10" DIA. ON LATHE
12 TEETH 1/2" DEEP
5/16" BRASS SHAFT
FIBRE KNOB
FAN MOTOR
BINDING POST
CONCAVE 3/4" X 1/2" LONG ELECTRODES OF SAME METAL AS DISC
INSULATE FROM MOTOR SHAFT WITH 3" DIA FIBRE CENTER DISC.
SOLDER COPPER RIBBON TO SHAFT
1/4" X 4" FIBRE SUPPORTS

ROTARY SPARK GAP

Above is shown the construction of the reactance choke which regulates the flow of current into the low-frequency transformer. A 5,000-volt heavy duty radio transformer supplies current to the Oudin Coil. The rotary spark gap described at right consists of a slotted copper disc rotated by an electric fan motor. The complete Oudin Coil hook-up is shown below.


CHOKE COIL TO LIMIT CURRENT
POWER TRANSFORMER
CONDENSERS CONNECTED IN SERIES—PARALLEL
BALL
HIGH FREQUENCY TRANSFORMER
SECOND.
5000 V.
110 V.
TO 110 VOLTS A.C.
ROTARY SPARK GAP
PRIM.
GROUND TO WATER PIPE

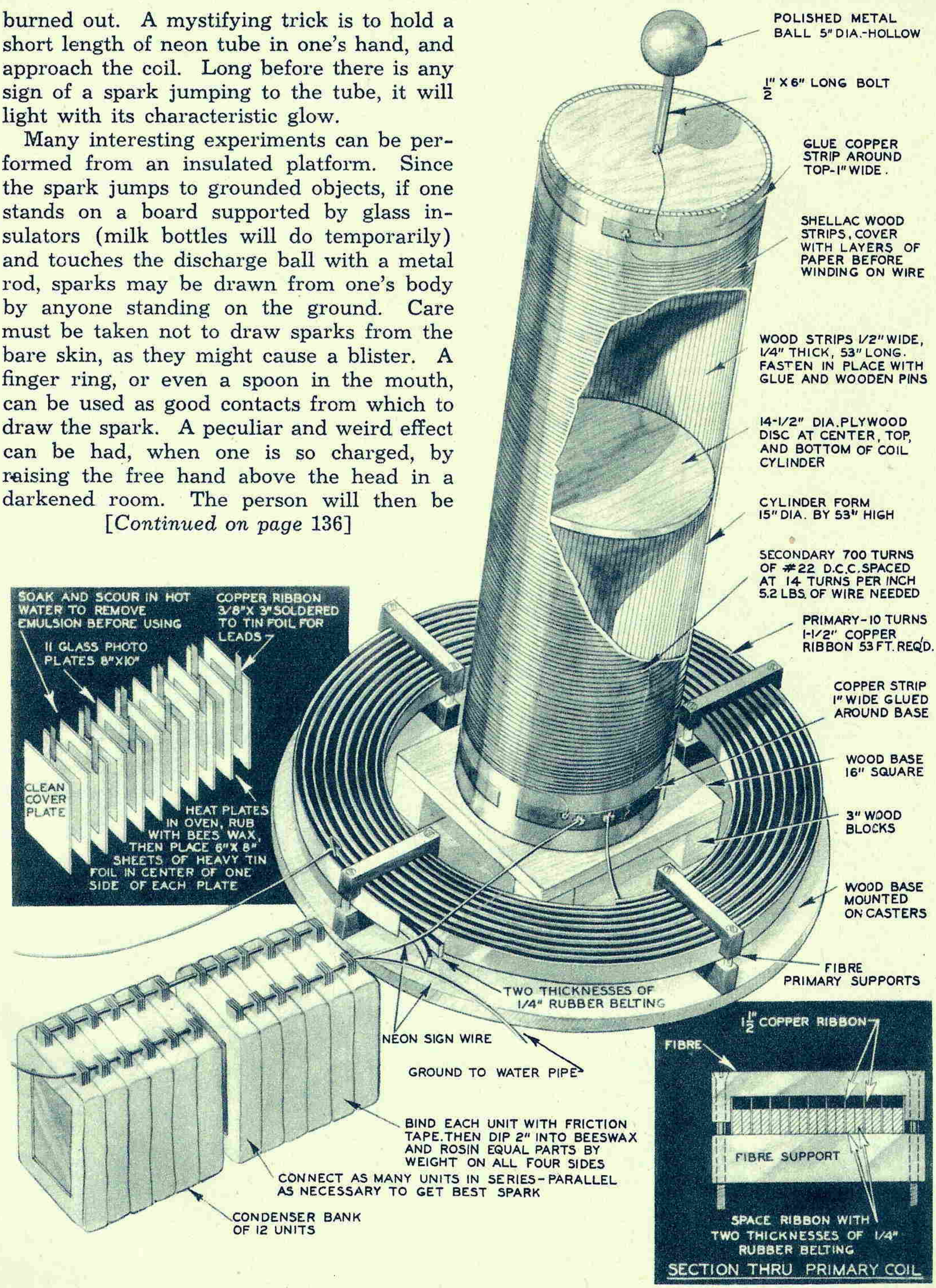
COMPLETE HOOKUP

WITH GIANT OUDIN COIL

burned out. A mystifying trick is to hold a short length of neon tube in one's hand, and approach the coil. Long before there is any sign of a spark jumping to the tube, it will light with its characteristic glow.

Many interesting experiments can be performed from an insulated platform. Since the spark jumps to grounded objects, if one stands on a board supported by glass insulators (milk bottles will do temporarily) and touches the discharge ball with a metal rod, sparks may be drawn from one's body by anyone standing on the ground. Care must be taken not to draw sparks from the bare skin, as they might cause a blister. A finger ring, or even a spoon in the mouth, can be used as good contacts from which to draw the spark. A peculiar and weird effect can be had, when one is so charged, by raising the free hand above the head in a darkened room. The person will then be

[*Continued on page* 136]

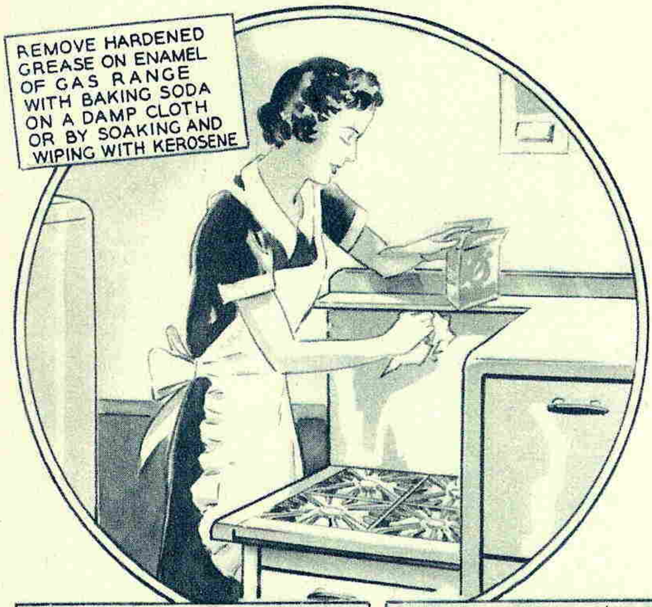

POLISHED METAL BALL 5" DIA.-HOLLOW
$\frac{1}{2}$" X 6" LONG BOLT
GLUE COPPER STRIP AROUND TOP-1" WIDE.
SHELLAC WOOD STRIPS, COVER WITH LAYERS OF PAPER BEFORE WINDING ON WIRE
WOOD STRIPS 1/2" WIDE, 1/4" THICK, 53" LONG. FASTEN IN PLACE WITH GLUE AND WOODEN PINS
14-1/2" DIA. PLYWOOD DISC AT CENTER, TOP, AND BOTTOM OF COIL CYLINDER
CYLINDER FORM 15" DIA. BY 53" HIGH
SECONDARY 700 TURNS OF #22 D.C.C. SPACED AT 14 TURNS PER INCH 5.2 LBS. OF WIRE NEEDED
PRIMARY-10 TURNS 1-1/2" COPPER RIBBON 53 FT. REQ'D.
COPPER STRIP 1" WIDE GLUED AROUND BASE
WOOD BASE 16" SQUARE
3" WOOD BLOCKS
WOOD BASE MOUNTED ON CASTERS
FIBRE PRIMARY SUPPORTS
TWO THICKNESSES OF 1/4" RUBBER BELTING
NEON SIGN WIRE
GROUND TO WATER PIPE
SOAK AND SCOUR IN HOT WATER TO REMOVE EMULSION BEFORE USING
COPPER RIBBON 3/8"X 3" SOLDERED TO TIN FOIL FOR LEADS
11 GLASS PHOTO PLATES 8"X10"
CLEAN COVER PLATE
HEAT PLATES IN OVEN, RUB WITH BEES' WAX, THEN PLACE 6"X 8" SHEETS OF HEAVY TIN FOIL IN CENTER OF ONE SIDE OF EACH PLATE
BIND EACH UNIT WITH FRICTION TAPE. THEN DIP 2" INTO BEESWAX AND ROSIN EQUAL PARTS BY WEIGHT ON ALL FOUR SIDES
CONNECT AS MANY UNITS IN SERIES-PARALLEL AS NECESSARY TO GET BEST SPARK
CONDENSER BANK OF 12 UNITS
1$\frac{1}{2}$" COPPER RIBBON
FIBRE
FIBRE SUPPORT
SPACE RIBBON WITH TWO THICKNESSES OF 1/4" RUBBER BELTING
SECTION THRU PRIMARY COIL

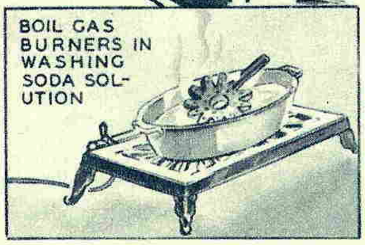
The Oudin Coil is assembled in the manner described above. Condensers are made by sandwiching tin foil between glass plates which are connected in a series-parallel arrangement. To prevent voltage breakdown, submerge condensers in oil.

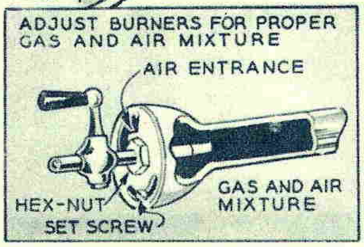
Home Repair Problems That

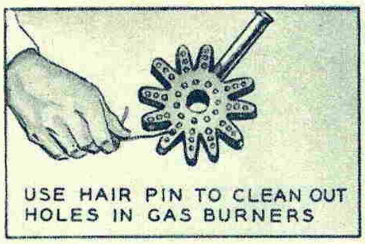
CLOGGED drains, faulty gas burners that need cleaning and adjustment and dirty chimneys are a few of the common household problems which confront the homemaker at some time or other. In every instance these repairs are simple enough for anyone to correct without the use of special tools.

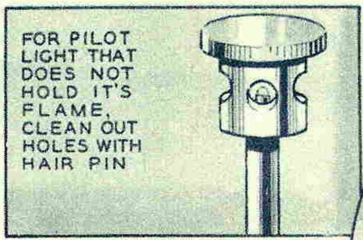
For example, the unsightly grease that collects on enameled ranges can be removed easily with a cloth saturated with kerosene or with a damp cloth and baking soda. Gas burners which fail to burn properly can be restored to proper working order by removing from the stove and boiling in a solution of water and baking soda. Where the burner flame is white the trouble is in the air vent. By loosening the set screw and closing this opening gradually the correct flame can be determined. The small holes in the burner should be cleaned from time to time to remove all grease that collects in them. Pilot lights


REMOVE HARDENED GREASE ON ENAMEL OF GAS RANGE WITH BAKING SODA ON A DAMP CLOTH OR BY SOAKING AND WIPING WITH KEROSENE

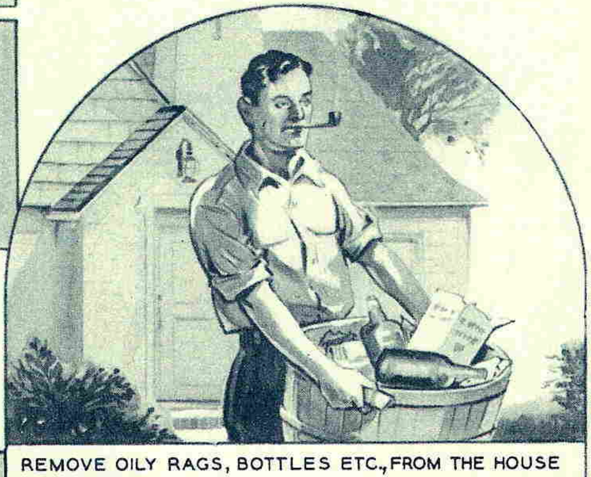

BOIL GAS BURNERS IN WASHING SODA SOLUTION

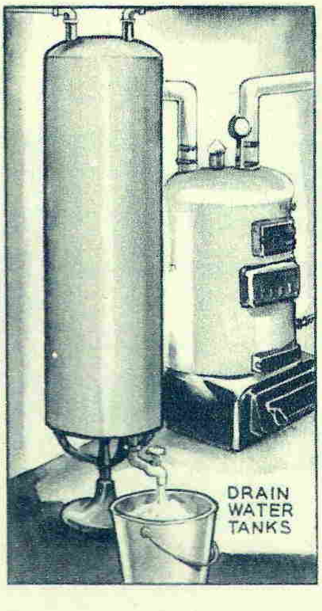

ADJUST BURNERS FOR PROPER GAS AND AIR MIXTURE
AIR ENTRANCE
HEX-NUT
SET SCREW
GAS AND AIR MIXTURE

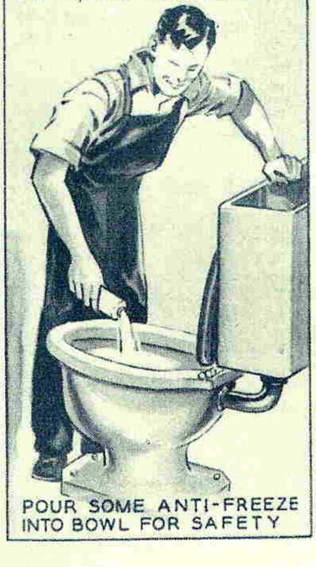

USE HAIR PIN TO CLEAN OUT HOLES IN GAS BURNERS

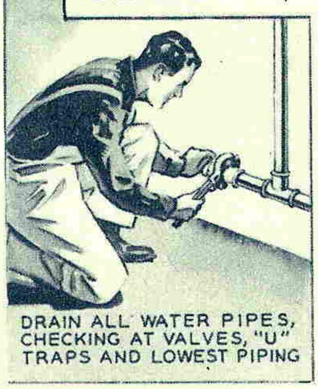

FOR PILOT LIGHT THAT DOES NOT HOLD IT'S FLAME, CLEAN OUT HOLES WITH HAIR PIN

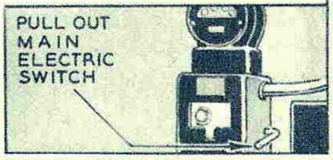
Following these suggestions the kitchen range can be restored to its original condition. Grease on enameled parts is removed with kerosene. Dirty burners should be boiled in baking soda and holes opened with a hairpin. Adjust air vent for correct burner flame.

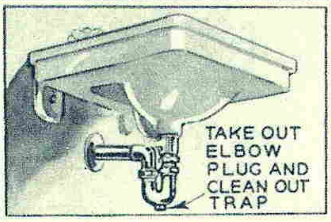

REMOVE OILY RAGS, BOTTLES ETC., FROM THE HOUSE


DRAIN WATER TANKS


SIPHON OUT WATER FROM BOWL, TRAP AND TANK
POUR SOME ANTI-FREEZE INTO BOWL FOR SAFETY


DRAIN ALL WATER PIPES, CHECKING AT VALVES, "U" TRAPS AND LOWEST PIPING


PULL OUT MAIN ELECTRIC SWITCH


TAKE OUT ELBOW PLUG AND CLEAN OUT TRAP

When leaving the home vacant over a period of time be sure that the electricity is turned off, oily rags removed and burned and water shut off. Clogged drains can be opened as shown.

Are Easily Solved

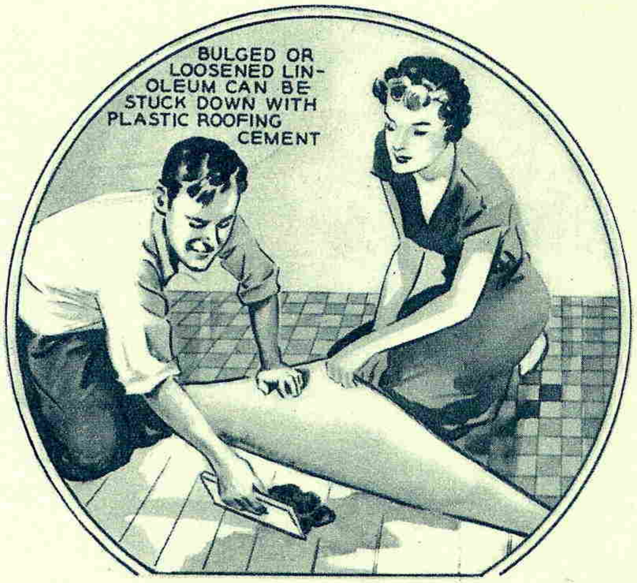
should be also given this treatment.

A bulge in the kitchen linoleum is not only annoying, but damaging to the flooring, itself. Where a section which has been cemented down comes loose it can be slitted and glued down with plastic roof cement. Roofing cement can also be used to repair cracked laundry tubs. Enlarge the crack with a chisel so cement can be inserted. Creaking floors can be silenced by driving small wedges between the beams and flooring. Rustic furniture can be protected against insects by giving it a clear coat of varnish.

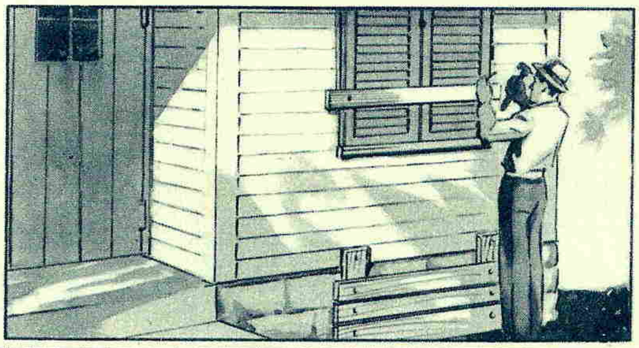
When a home is left vacant during the winter drain all water pipes to prevent their bursting. Tanks should be drained as well as all drain traps. Toilet traps should be filled with an anti-freeze solution and the water shut off in the basement where it enters the house.

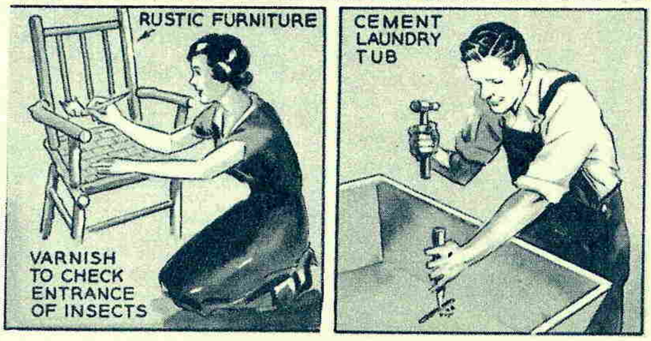
In leaving a home vacant for a period of time always remove old clothing, greasy rags,

[*Continued on page* 134]

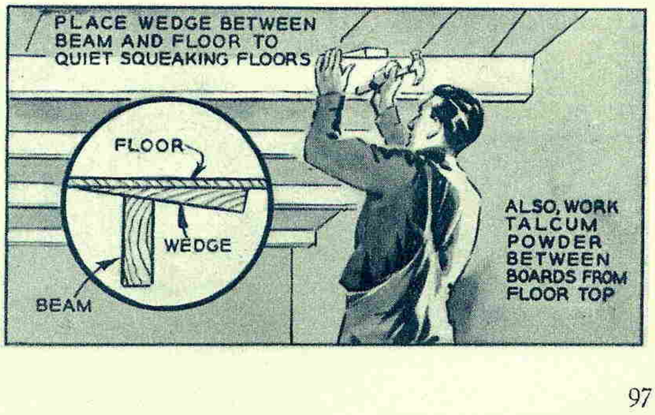

BULGED OR LOOSENED LINOLEUM CAN BE STUCK DOWN WITH PLASTIC ROOFING CEMENT

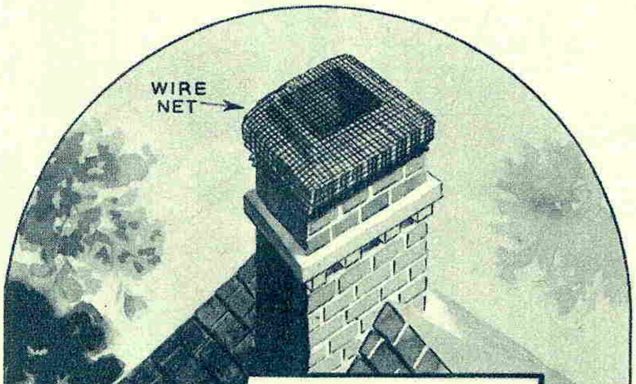
Loose linoleum can be cemented back in place by applying a coat of plastic roof cement to the floor in this manner. Where there is a bulge in the center of the floor split linoleum with a sharp knife, apply plastic cement and press firmly into place.



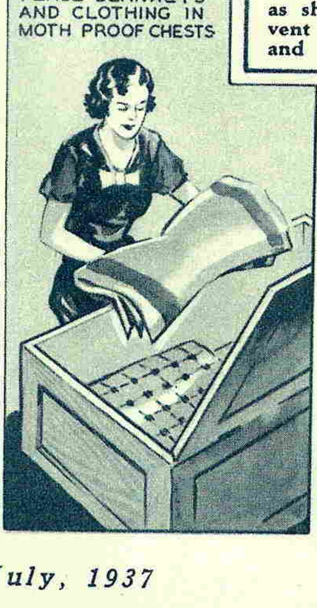

RUSTIC FURNITURE
VARNISH TO CHECK ENTRANCE OF INSECTS
CEMENT LAUNDRY TUB

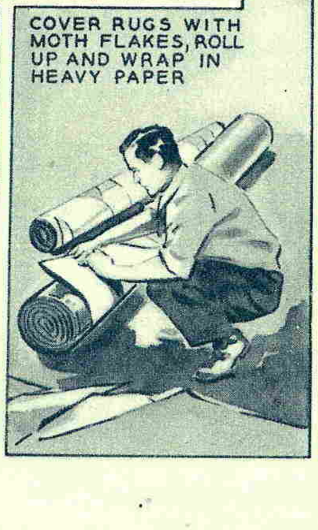
Rustic furniture can be protected against bugs by coating with varnish. Cracked laundry tub can be repaired with roofing cement. Below—Wedges driven between beams stop squeaks.


PLACE WEDGE BETWEEN BEAM AND FLOOR TO QUIET SQUEAKING FLOORS
FLOOR
WEDGE
BEAM
ALSO, WORK TALCUM POWDER BETWEEN BOARDS FROM FLOOR TOP

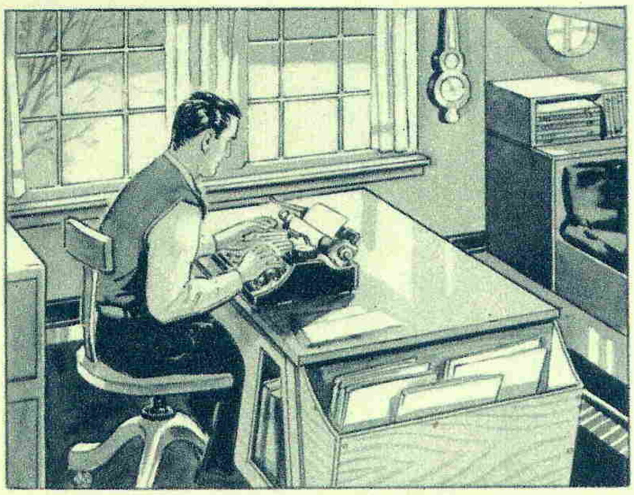


A fire screen of heavy mesh over the chimney as shown here will prevent sparks from flying and igniting the roof.


PLACE BLANKETS AND CLOTHING IN MOTH PROOF CHESTS

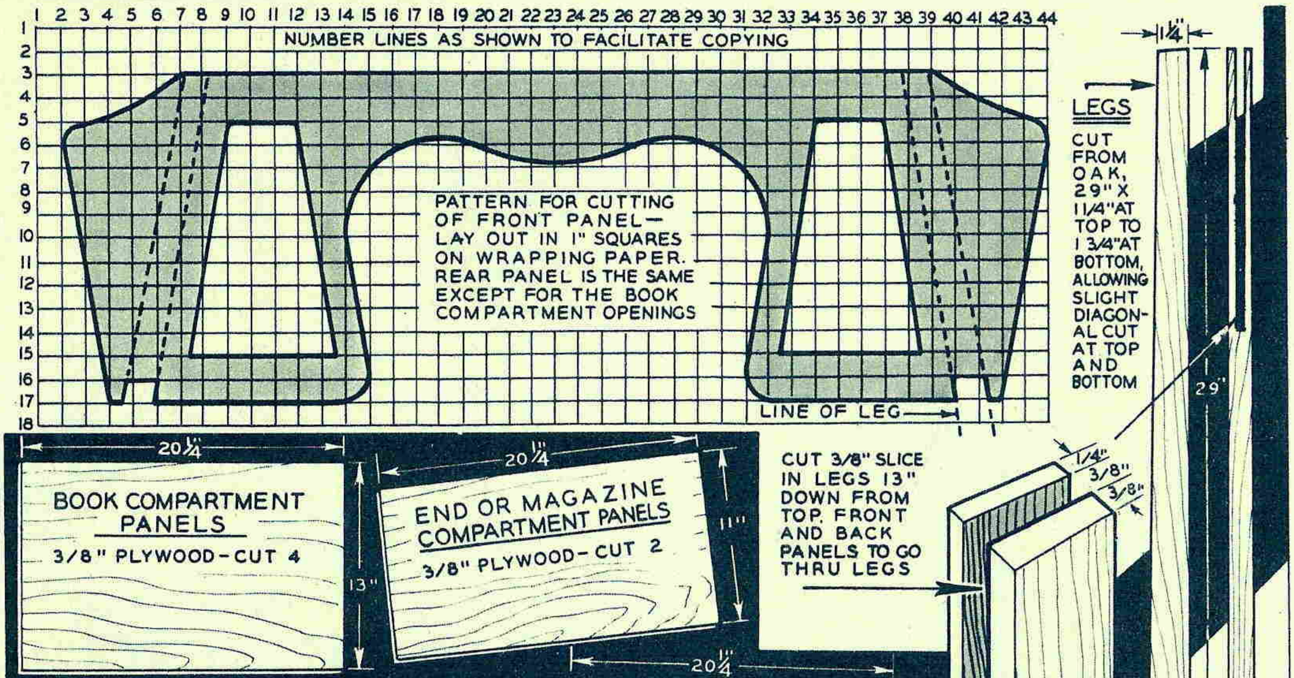

COVER RUGS WITH MOTH FLAKES, ROLL UP AND WRAP IN HEAVY PAPER

This Individuality Table Is A

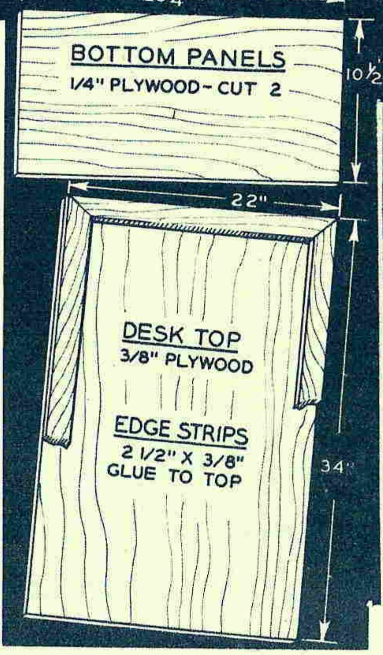


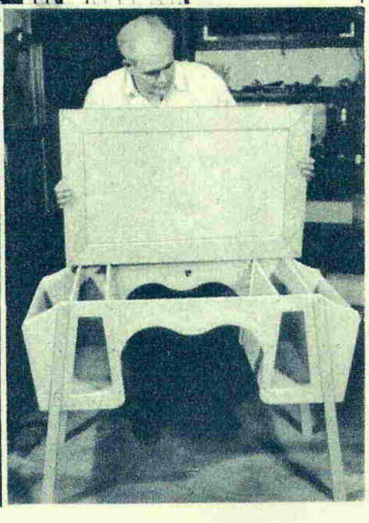
HERE is a readily salable and novel project which can be turned out on a nominal quantity production basis in the home workshop of the hobbyist who would like to make his shop pay dividends. Its simplicity, too, commends it to the newcomer in the home workshop field as no exacting cabinet work enters into the construction. The table is strong and enduring and, while adhering to the fundamental design, it can be produced in a thousand and one different designs. The sheer novelty of the latter factor makes the table a ready seller for the customer actually designs his own table.

The accompanying illustrations show the semi-finished and finished table. A table of this design is rather pleasing to the eye and its all-around utility is manifold. It is suitable for use in either a living-room or a student's room. The racks at each end are just the right size to receive large magazines; the pigeonholes accommodate books and the usual all-fiction magazines while the height of the table, combined with the pattern of


1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44
1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18
NUMBER LINES AS SHOWN TO FACILITATE COPYING
PATTERN FOR CUTTING OF FRONT PANEL— LAY OUT IN 1" SQUARES ON WRAPPING PAPER. REAR PANEL IS THE SAME EXCEPT FOR THE BOOK COMPARTMENT OPENINGS
LINE OF LEG
LEGS
CUT FROM OAK, 29" X 1 1/4" AT TOP TO 1 3/4" AT BOTTOM, ALLOWING SLIGHT DIAGONAL CUT AT TOP AND BOTTOM
1 1/4"
29"
20 1/4"
BOOK COMPARTMENT PANELS
3/8" PLYWOOD - CUT 4
13"
20 1/4"
END OR MAGAZINE COMPARTMENT PANELS
3/8" PLYWOOD - CUT 2
11"
CUT 3/8" SLICE IN LEGS 13" DOWN FROM TOP. FRONT AND BACK PANELS TO GO THRU LEGS
1/4"
3/8"
3/8"
1 3/4"
1"

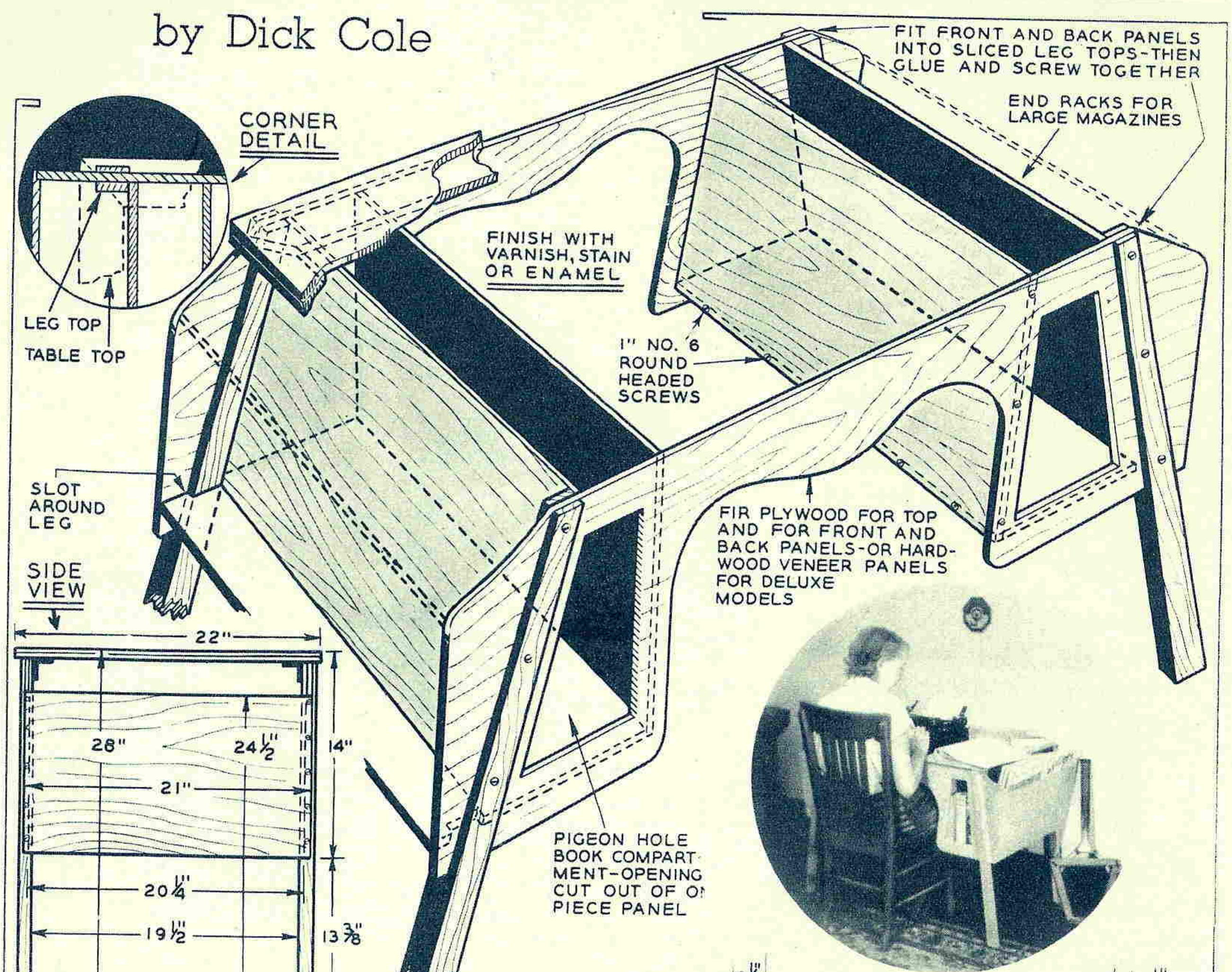
Lay out patterns for front and back panels on heavy brown wrapping paper using one inch squares for a guide. The style of the table can be altered simply by changing panel designs.

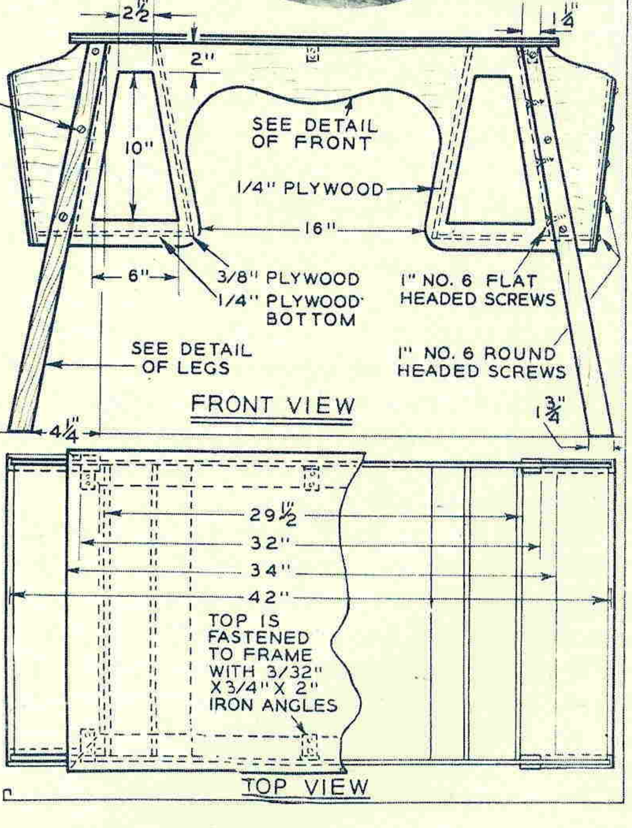

20 1/4"
BOTTOM PANELS
1/4" PLYWOOD - CUT 2
10 1/2"
22"
DESK TOP
3/8" PLYWOOD
EDGE STRIPS
2 1/2" X 3/8"
GLUE TO TOP
34"



Profitable Workshop PROJECT

by Dick Cole

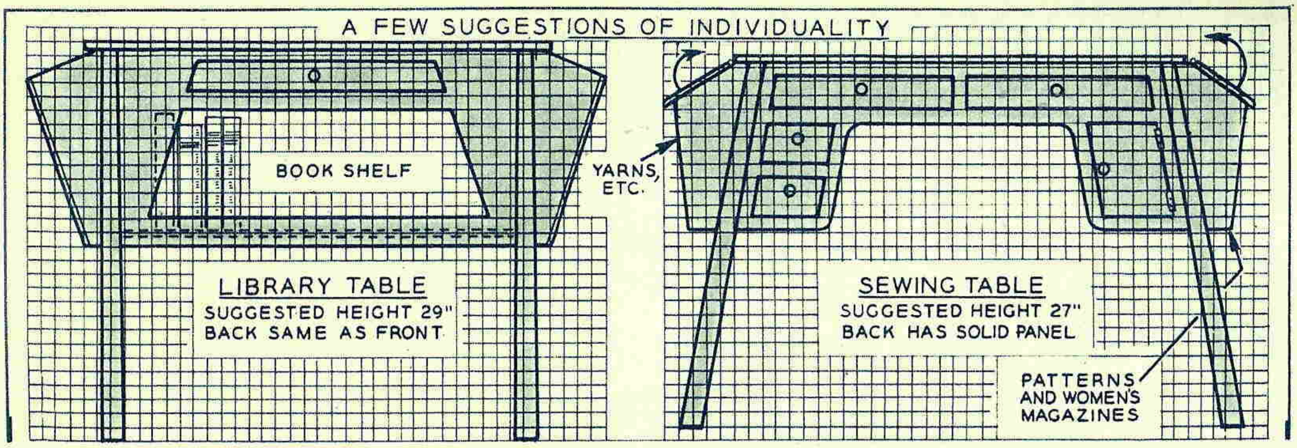

FIT FRONT AND BACK PANELS INTO SLICED LEG TOPS-THEN GLUE AND SCREW TOGETHER
END RACKS FOR LARGE MAGAZINES
CORNER DETAIL
LEG TOP
TABLE TOP
FINISH WITH VARNISH, STAIN OR ENAMEL
1" NO. 6 ROUND HEADED SCREWS
SLOT AROUND LEG
FIR PLYWOOD FOR TOP AND FOR FRONT AND BACK PANELS-OR HARDWOOD VENEER PANELS FOR DELUXE MODELS
PIGEON HOLE BOOK COMPARTMENT-OPENING CUT OUT OF O PIECE PANEL
SIDE VIEW
22"
28"
24½"
14"
21"
20¼"
19½"
13⅜"


NO. 8 OVAL HEADED SCREWS
2½"
1¼"
2"
10"
SEE DETAIL OF FRONT
1/4" PLYWOOD
16"
6"
3/8" PLYWOOD
1/4" PLYWOOD BOTTOM
1" NO. 6 FLAT HEADED SCREWS
SEE DETAIL OF LEGS
1" NO. 6 ROUND HEADED SCREWS
FRONT VIEW
4¼"
1¾"
29½"
32"
34"
42"
TOP IS FASTENED TO FRAME WITH 3/32" X3/4" X 2" IRON ANGLES
TOP VIEW

The table's construction is shown here in perspective form. Fir plywood is used throughout for all paneling although a better grade of plyboard can be employed if so desired. The various dimensions are indicated in the details at right.

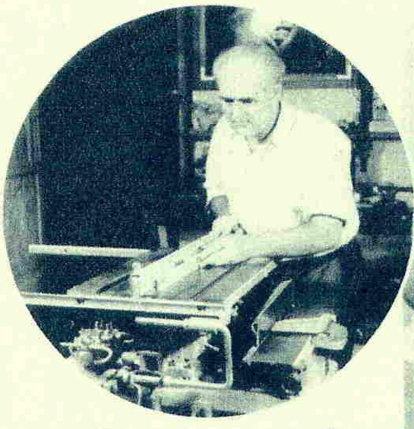
the front, makes it ideal for typing. The table literally sets in the typist's lap.

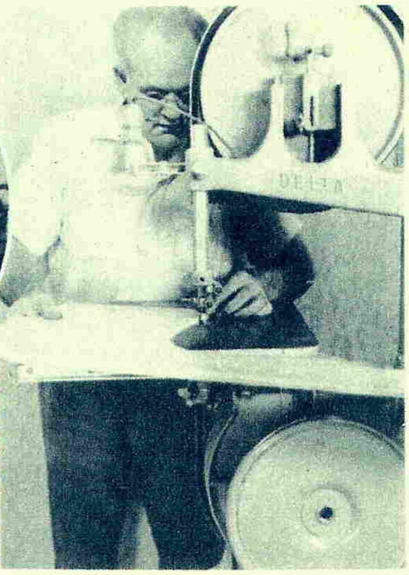
By referring to the plans the utter simplicity of the construction will be realized. Excepting for the legs and the bottom panels, all material is ⅜″ plyboard. Ordinary fir plyboard, with a well-patterned grain, will serve very well, but one can use any of the hardwood veneer panels for "de-luxe" models if desired. The front and back pieces which we will call "panels," although technically they are "rails"—are cut from one piece of plyboard on the bandsaw or scrollsaw, as the design demands. The legs are slotted to receive the ⅜″ panels and held together in pairs by a cross-panel of ⅜″ plyboard glued and screwed to the legs. This



These patterns are only two examples of the many table styles which are possible with the general desk design described on the previous pages. Both library and sewing tables involve only simple construction work.

results in light, but very rigid construction. The end panels of the magazine rack and the other cross-panels, which serve as partitions, add further rigidity to the table. The top is of 3/8" plyboard, but a plywood border strip of the same thickness brings the edge thickness of the top to 3/4-inch. It is well to cut the legs from 1" oak, although clear pine will do. It will be noted that they taper from 1 1/4 inches at the top to 1 3/4 inches at the bottom.





If you are fortunate to own a well equipped shop, the making of the desks on a production basis will not be difficult. Above is shown the cutting of the leg slots on a circular saw while at the right a band saw is being used to cut out the front and back panels.

In building up these tables on a small quantity production basis it is best to make up the legs in pairs as shown in the details on page 98. These assembled units are standard for a wide variety of table fronts. It will be readily seen how the front and back panels fit into the slots in the legs so that, when they are glued up and screwed in place, a very rigid table frame is formed. Fitting of the cross-partitions and the top finishes up the table after which it is ready for varnish, stain or enamel.

Of course the design offered in the detailed plans is only one of hundreds which can be incorporated into the basic construction. On this page several tentative designs, solely to illustrate the far-reaching possibilities of the general design, are shown.

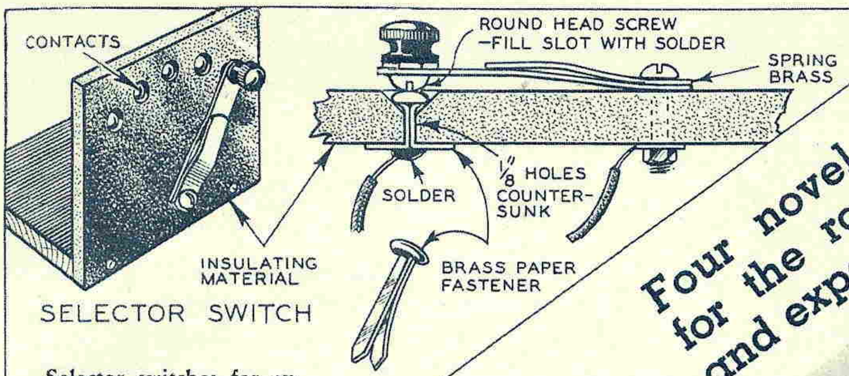
The big selling point of these tables is that they apparently are "custom built" at "ready-made" cost. It will be found that nine out of ten housewives have a desire for a special table for some special place or need. By showing these women a number of designs of the "Individuality Table" and explaining that it will be built to their own design, the builder will have no trouble in selling them the idea. Give them the graph chart like the one shown on page 98, made full-size on common wrapping paper, and instruct the customer to lay out the front design she wants, keeping the design within the block of squares. Then cut out the legs, cut off to height desired and paste or pin them at the location desired.

The builder merely lays the prepared pattern on the plyboard and cuts it out in a jiffy on the scroll-saw or bandsaw. If drawers are wanted, a very fine blade is used in the scroll-saw and the piece cut out of the panel is used for the drawer front thus giving an unbroken grain to the front panel. Obviously slats nailed or glued to cross-partitions serve as slide-rails for the drawers.

The finish of the table is optional with the customer. Many will want it in natural wood and will finish it themselves to match other pieces. Ofttimes fir plyboard can be secured in a grain which closely resembles plain oak. There is no limit to the variations in construction and design of these tables.

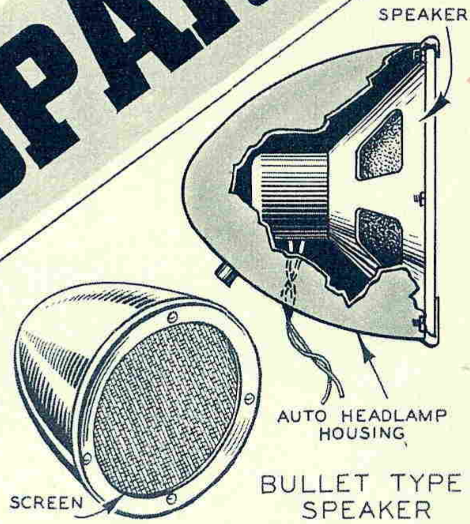
RADIO SPARKS

Four novel kinks for the radio fan and experimenter.


CONTACTS
ROUND HEAD SCREW —FILL SLOT WITH SOLDER
SPRING BRASS
1/8 HOLES COUNTER-SUNK
SOLDER
INSULATING MATERIAL
BRASS PAPER FASTENER

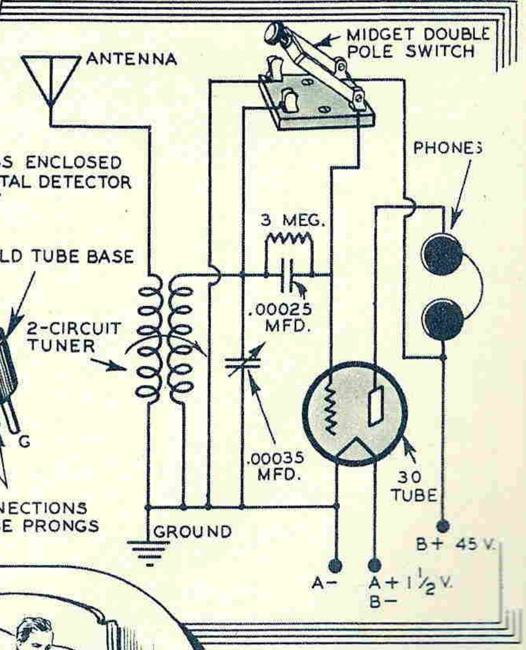
SELECTOR SWITCH

Selector switches for experimental purposes can be made as described above. Brass paper clips serve as contact points.


SPEAKER
AUTO HEADLAMP HOUSING
SCREEN

BULLET TYPE SPEAKER

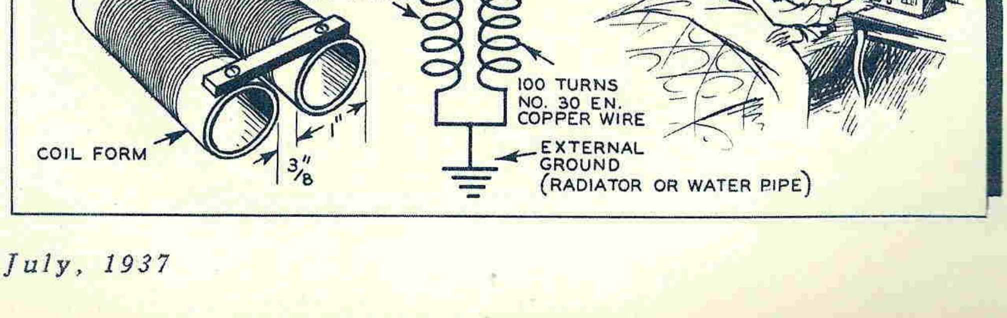
Old auto headlight shells serve as bullet type loudspeaker housings for outdoor use. Fine wire mesh is stretched over inside of lens rim and held rigid by speaker bolts.


ANTENNA
MIDGET DOUBLE POLE SWITCH
PHONES
GLASS ENCLOSED CRYSTAL DETECTOR
OLD TUBE BASE
3 MEG.
.00025 MFD.
2-CIRCUIT TUNER
.00035 MFD.
30 TUBE
P
G
NO CONNECTIONS TO LARGE PRONGS
GROUND
B+ 45 V.
A−
A+ 1 1/2 V.
B−

COMBINATION CRYSTAL–TUBE RECEIVER

This unique set permits either crystal or tube detection by a simple throw of a double-pole switch. Mount the crystal on a 4-prong tube base, connecting it to P and G prongs. To use as crystal receiver throw switch to left, remove type 30 tube and insert crystal in its place.

ANTENNA ELIMINATOR


GROUND POST ON RECEIVER
ANTENNA POST ON RECEIVER
100 TURNS
100 TURNS NO. 30 EN. COPPER WIRE
EXTERNAL GROUND (RADIATOR OR WATER PIPE)
COIL FORM
1"
3/8"

This novel inductance type antenna eliminator permits any modern electric receiver to be operated with one connection to water pipe. Wind the coils as described at left.

A MIDGET Superheterodyne

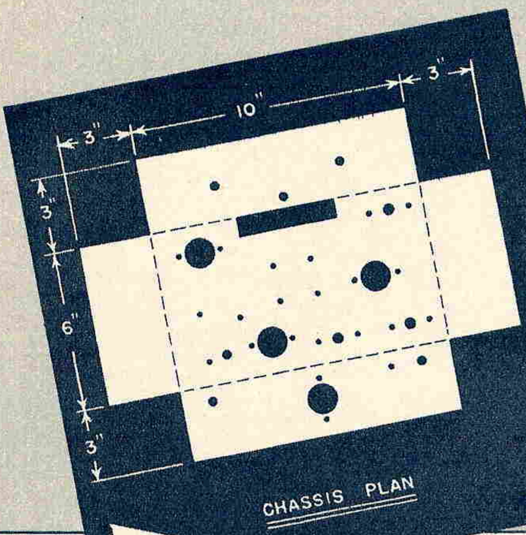
by Bill Bartlett

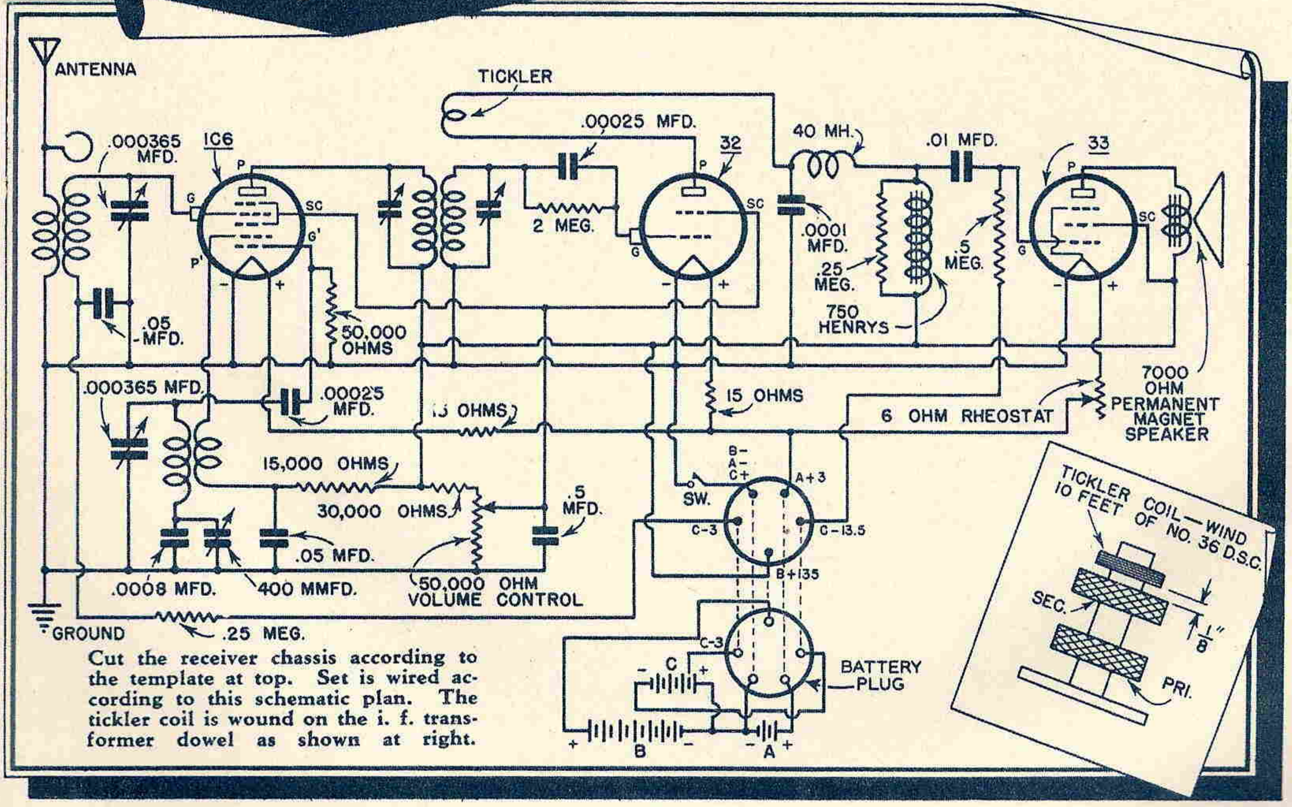
Though simple in design, this 3-tube set provides ample volume to operate a small speaker.

WHILE the usual superheterodyne circuit is a complicated, multi-tube affair, difficult for the average amateur to build, here is an effective "super" that is simple in construction and uses only three tubes of the 2-volt type. These tubes give exceptionally good results on the broadcast band. One of the unique features of the set is the small number of parts required. The total cost of materials, less tubes and batteries, should not exceed ten dollars.

The circuit employs a pentagrid converter type 1C6 in the first stage as electron-coupled mixer. By using a good aerial and an efficient ground, the need for a preceding radio-frequency amplifier stage is eliminated. No intermediate-frequency amplifier stage is used; instead, the mixed frequency is fed directly into the type 32 detector which is made to regenerate, thus compensating the lack of the i. f. stage gain. The detected signal flows into the type 33 screen-grid power tube, which delivers half a watt or more to the permanent-magnet speaker.

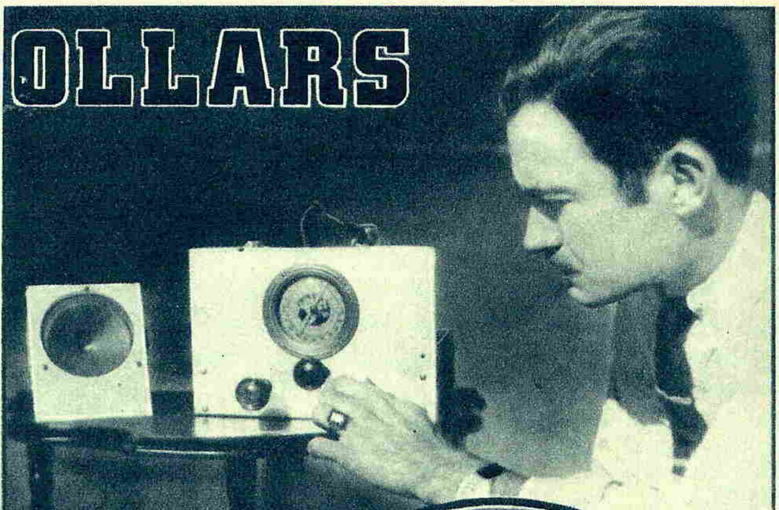
The set is built on an electralloy sub-panel, 3" high by 6" deep by 10" wide. The front


10"
3"
3"
3"
6"
3"
CHASSIS PLAN


ANTENNA
.000365 MFD.
1C6
P
G
SC
G'
P'
.05 MFD.
50,000 OHMS
TICKLER
.00025 MFD.
2 MEG.
32
40 MH.
.01 MFD.
33
.0001 MFD.
.25 MEG.
750 HENRYS
.5 MEG.
.000365 MFD.
.00025 MFD.
15 OHMS
15 OHMS
6 OHM RHEOSTAT
7000 OHM PERMANENT MAGNET SPEAKER
15,000 OHMS
30,000 OHMS
.5 MFD.
.05 MFD.
.0008 MFD.
400 MMFD.
50,000 OHM VOLUME CONTROL
B-
A-
C+
A+3
SW.
C-3
C-13.5
B+135
BATTERY PLUG
C
B
A
GROUND
.25 MEG.
TICKLER COIL—WIND 10 FEET OF NO. 36 D.S.C.
SEC.
PRI.
1/8"

Cut the receiver chassis according to the template at top. Set is wired according to this schematic plan. The tickler coil is wound on the i. f. transformer dowel as shown at right.

FOR TEN DOLLARS



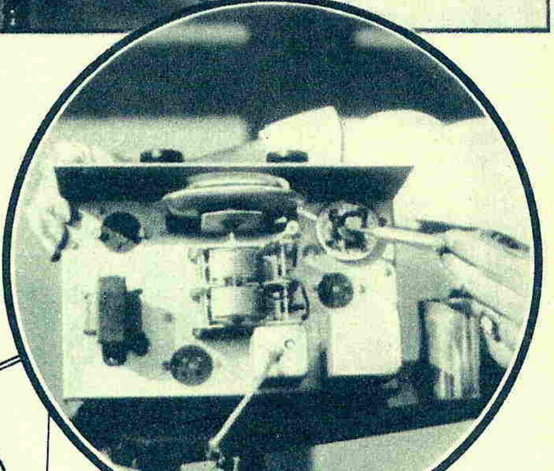
panel, of the same metal, measures 7" x 10". With a panel cutter or an expansive bit, cut a four-inch hole in the center of the front panel to accommodate the large airplane style dial used for tuning. Below this opening, drill a ⅜" hole to take the shaft of the dial. To either side, at spaced distances to maintain a balanced panel, drill ½" holes to mount the regeneration potentiometer and the volume control filament rheostat for the 33 tube.

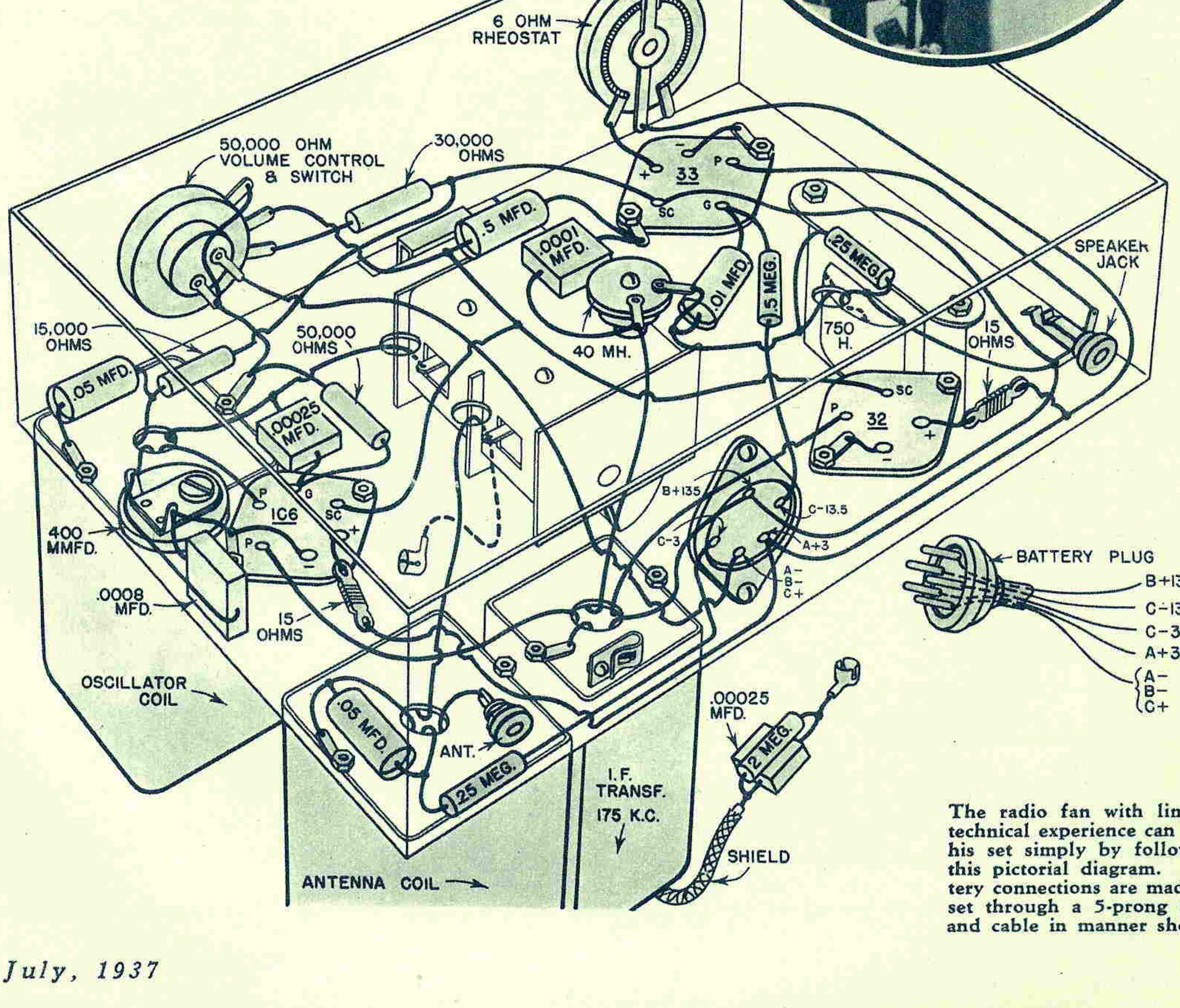
The disposal of the various circuit components is so clearly shown that by following the photos, the layout can be accurately duplicated. Note that parts are spaced to allow simplified wiring by beginners.

The antenna signal enters the circuit

[*Continued on page* 126]

Here is the midget superheterodyne in operation. A view of the set, looking down on the top of chassis and showing parts arrangement, appears at right.




6 OHM RHEOSTAT
50,000 OHM VOLUME CONTROL & SWITCH
30,000 OHMS
33
P
SC
G
+
-
.5 MFD.
.0001 MFD.
.01 MFD
.5 MEG.
.25 MEG.
SPEAKER JACK
15,000 OHMS
50,000 OHMS
40 MH.
750 H.
15 OHMS
.05 MFD.
.00025 MFD.
32
1C6
400 MMFD.
.0008 MFD.
15 OHMS
B+135
C-13.5
C-3
A+3
A- B- C+
BATTERY PLUG
B+135
C-13.5
C-3
A+3
A- B- C+
OSCILLATOR COIL
.05 MFD.
ANT.
.25 MEG.
I.F. TRANSF. 175 K.C.
.00025 MFD.
2 MEG.
SHIELD
ANTENNA COIL

The radio fan with limited technical experience can wire his set simply by following this pictorial diagram. Battery connections are made to set through a 5-prong plug and cable in manner shown.

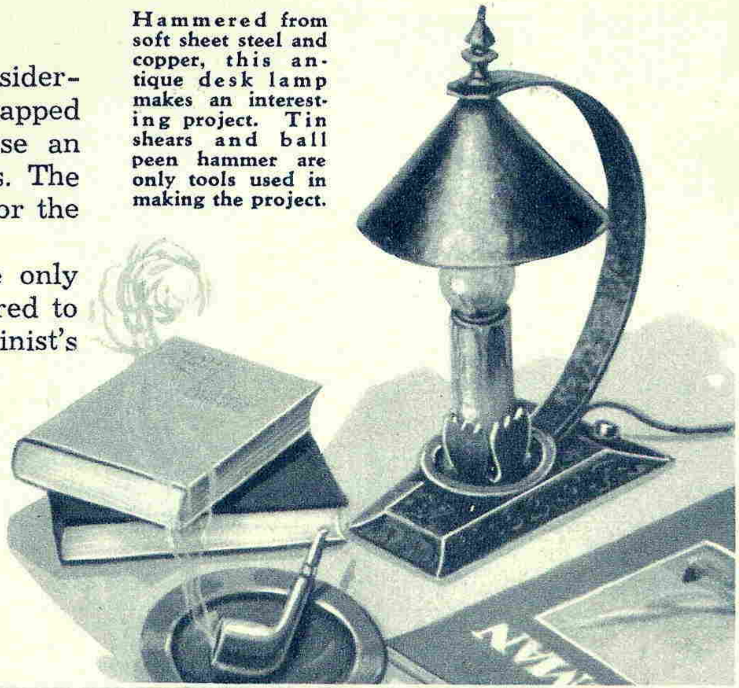
TAPPED METAL FOR THE HOME

by Dick Hutchinson

THE workshop fan will derive considerable pleasure in making these tapped metal desk accessories which comprise an antique lamp and owl shaped book-ends. The book-ends are especially appropriate for the person who reads far into the night.

Soft sheet steel and copper are the only materials required and can be hammered to shape on an anvil with an ordinary machinist's hammer. Except for a pair of tin shears and nail set no other tools are required in the making of these projects.

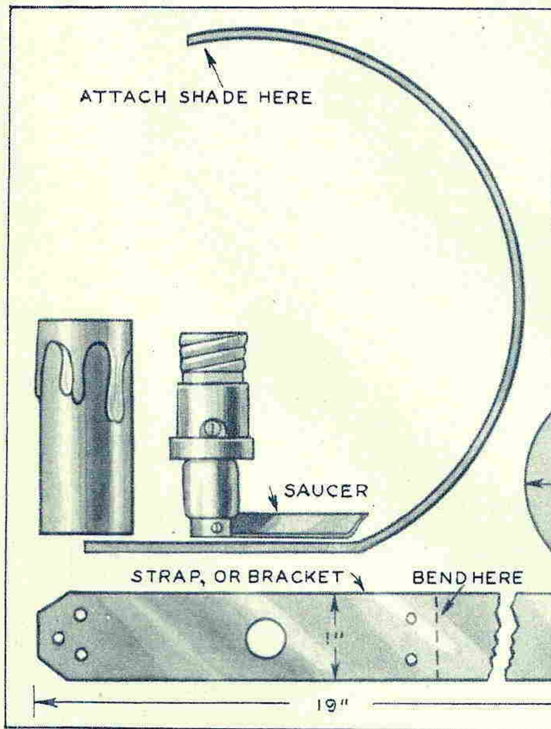
Copper and iron are combined in the construction of the desk lamp, producing a contrast that is unusually attractive.

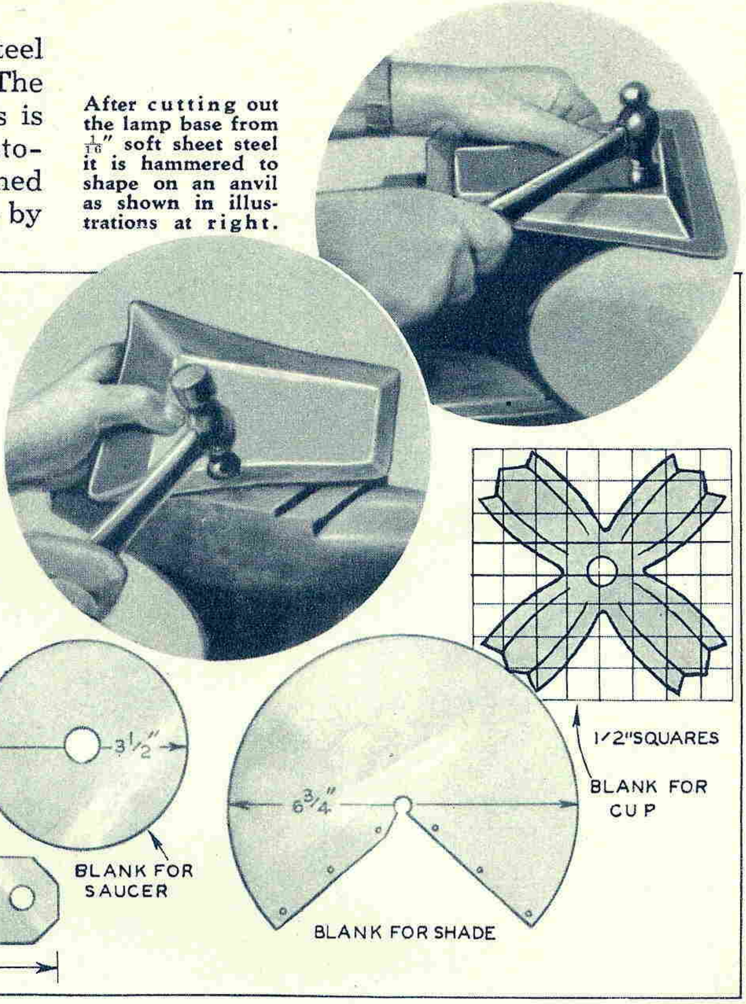


Hammered from soft sheet steel and copper, this antique desk lamp makes an interesting project. Tin shears and ball peen hammer are only tools used in making the project.

The lamp base is of $\frac{1}{16}''$ soft sheet steel cut out, as shown, with the tin shears. The raising is done from the under side as is described in the accompanying photographs after which the piece is turned over and the upper corners squared up by

After cutting out the lamp base from $\frac{1}{16}''$ soft sheet steel it is hammered to shape on an anvil as shown in illustrations at right.





These original book ends are tapped from 18-gauge soft sheet steel. Cut the owls according to the template plans below.

ACCESSORIES STUDY DESK

hammering them over the edge of an anvil. The lower edge or rim is rolled out, filed off even and holes drilled for fixtures.

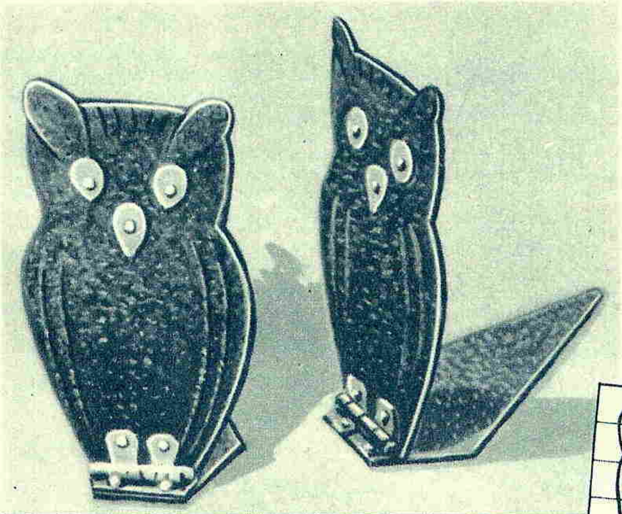
A disk 3¼″ in diameter is cut from the same material, hammered into shape and a $\frac{7}{16}$″ hole drilled in the center for the mounting screw.

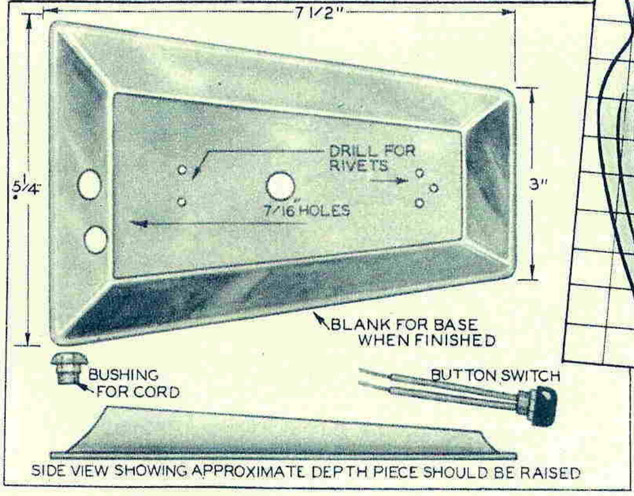
The cup is cut from 24-gauge soft sheet copper, hammered on one side and the lines cut in with a blunt cold chisel. Next a $\frac{7}{16}$″ hole is drilled in the center and the piece is bent to shape.

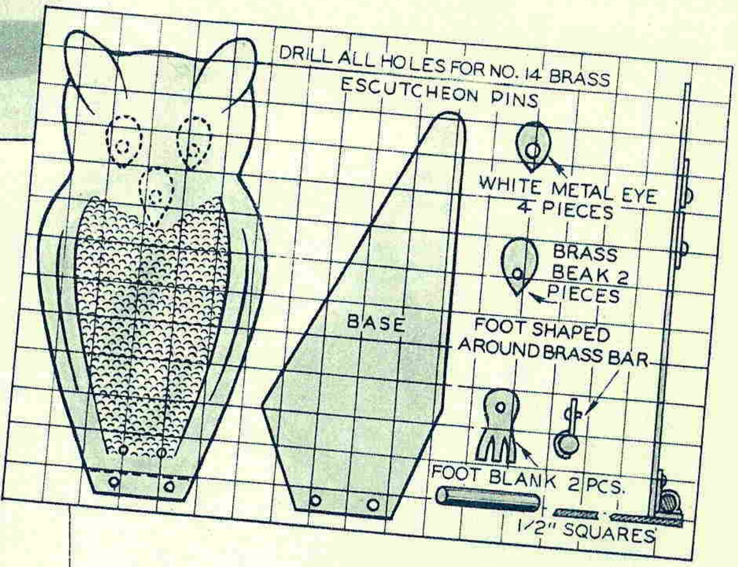
The shade is also cut from 24-gauge soft sheet copper, hammered on one side, rolled into shape and riveted together with No. 16 brass escutcheon pins. The shade bracket is a strip of $\frac{3}{16}$″ soft sheet steel, 1⅛″ wide by 19½″ long. Is hammered on one side, drilled and bent to shape.

In assembling, fit a composition fixture bushing into the base for admitting the cord and also a button switch. Set the bracket in the center of the base and rivet to the base, then set the saucer in place with the copper cup in the center. Insert a brass fixture bushing from the under side and to this screw a candle socket. Run the lamp cord in through the composition bushing, connect one wire

[*Continued on page* 130]




7 1/2"
5 1/4"
3"
DRILL FOR RIVETS
7/16" HOLES
BLANK FOR BASE WHEN FINISHED
BUSHING FOR CORD
BUTTON SWITCH
SIDE VIEW SHOWING APPROXIMATE DEPTH PIECE SHOULD BE RAISED


DRILL ALL HOLES FOR NO. 14 BRASS ESCUTCHEON PINS
WHITE METAL EYE 4 PIECES
BRASS BEAK 2 PIECES
BASE
FOOT SHAPED AROUND BRASS BAR
FOOT BLANK 2 PCS.
1/2" SQUARES

The owl book ends are first laid out actual size on paper ruled off into ½″ squares for a guide. Cut eyes from aluminum or chrome metal and the feet from soft yellow brass.

CONVERTING AN AUTO ENGINE

Any boat fan handy with tools can make his own marine conversion. A Model A engine and parts salvaged from junked cars comprise materials needed for making a serviceable power plant.

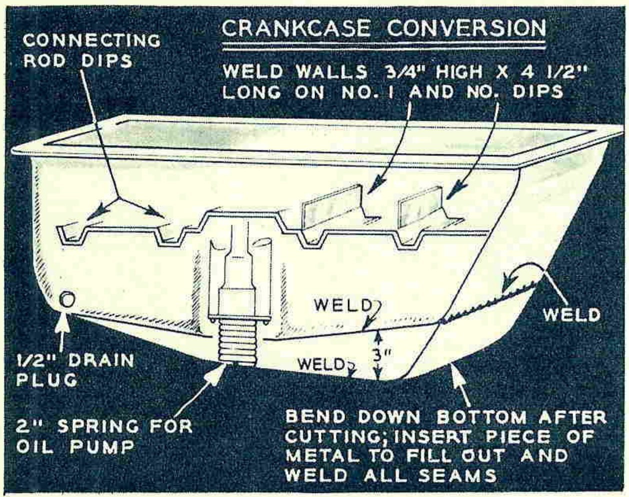
IN CONVERTING an automobile engine for marine use, three things are essential. They are oiling, cooling and a satisfactory reverse gear.

With the present high speed motors, driving a boat without a reverse gear is like driving a car without brakes.

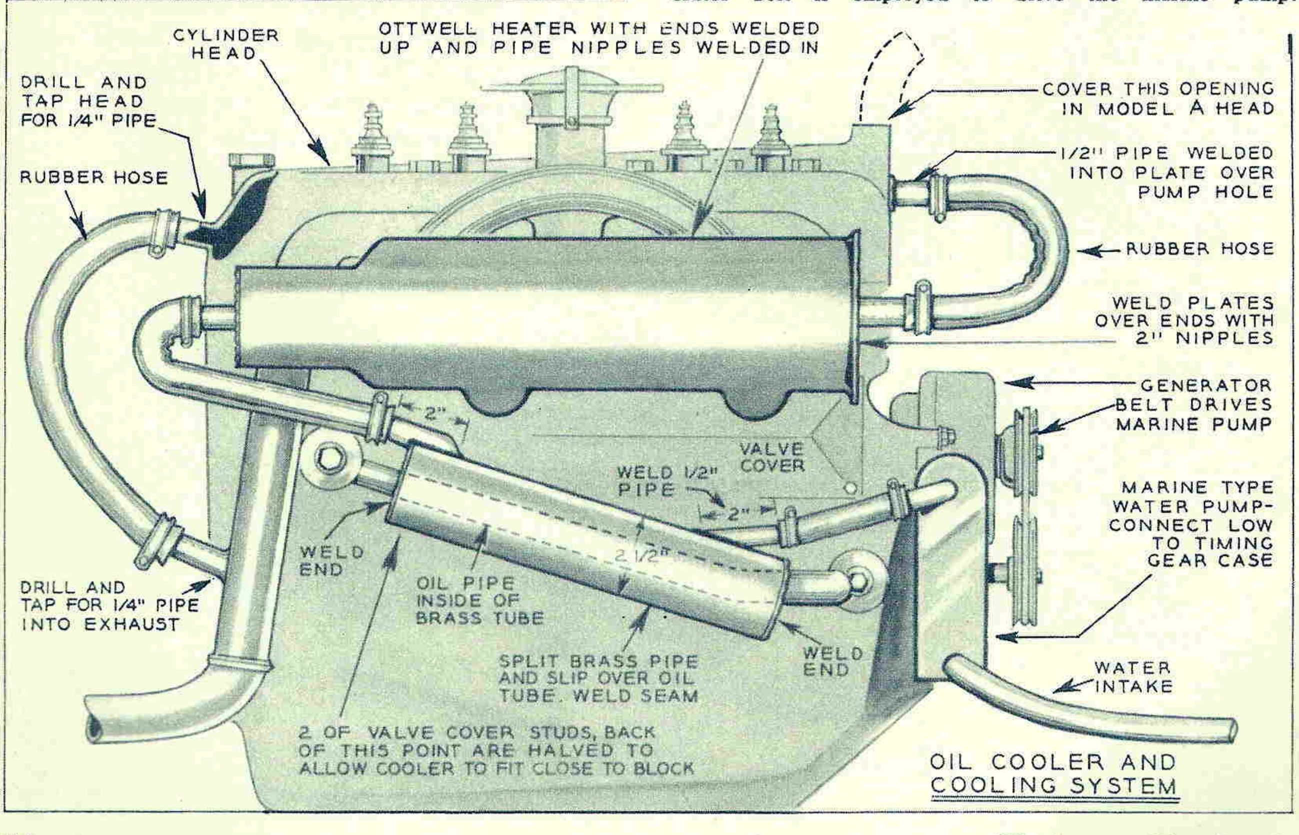
The following is an outline of a simple system of cooling and oiling a Model "A" Ford motor and a simple reverse gear built up from scrap parts of Model "T" and "A" transmissions.

I have used this converted engine and gear slightly over 450 hours without a single alteration or mishap other than an occasional new lining in the reverse band. Welding is the biggest item in the conversion and should not cost over $12.00. Machine work will be approximately $3.50. The balance of cost will be for used parts from the junk yards.

Choose a motor in good condition or have it put in good condition as in regards to pistons, rings and valves. First take the regular crankcase and cut along each lower corner and across the front end. Then bend the bottom section down 3 inches at the front and insert wedge shaped strips of metal of the same material as that of the crankcase. This pan will hold an extra quart of oil and allow

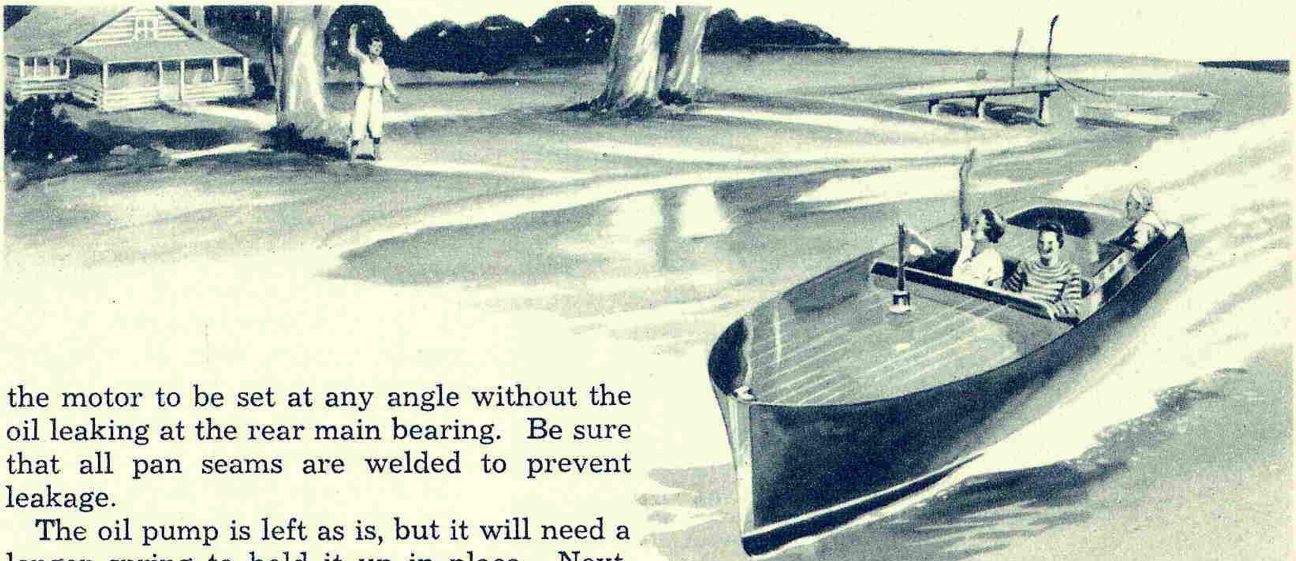

CRANKCASE CONVERSION
CONNECTING ROD DIPS
WELD WALLS 3/4" HIGH X 4 1/2" LONG ON NO. 1 AND NO. DIPS
WELD
WELD
WELD
3"
1/2" DRAIN PLUG
2" SPRING FOR OIL PUMP
BEND DOWN BOTTOM AFTER CUTTING; INSERT PIECE OF METAL TO FILL OUT AND WELD ALL SEAMS

To convert the "A" engine for marine use, the crankcase housing must first be deepened to allow for motor's operation at all angles. Weld a 3-inch section to the bottom tapered as shown and replace the oil pump spring with a larger one to hold it in position. Weld metal fins to dips 1 and 2 to distribute oil properly. Details of the water cooled manifold and oil cooling system are shown below. Note that the generator belt is employed to drive the marine pump.


CYLINDER HEAD
OTTWELL HEATER WITH ENDS WELDED UP AND PIPE NIPPLES WELDED IN
DRILL AND TAP HEAD FOR 1/4" PIPE
RUBBER HOSE
COVER THIS OPENING IN MODEL A HEAD
1/2" PIPE WELDED INTO PLATE OVER PUMP HOLE
RUBBER HOSE
WELD PLATES OVER ENDS WITH 2" NIPPLES
GENERATOR BELT DRIVES MARINE PUMP
2"
VALVE COVER
WELD 1/2" PIPE
2"
MARINE TYPE WATER PUMP-CONNECT LOW TO TIMING GEAR CASE
WELD END
2 1/2"
OIL PIPE INSIDE OF BRASS TUBE
DRILL AND TAP FOR 1/4" PIPE INTO EXHAUST
SPLIT BRASS PIPE AND SLIP OVER OIL TUBE. WELD SEAM
WELD END
WATER INTAKE
2 OF VALVE COVER STUDS, BACK OF THIS POINT ARE HALVED TO ALLOW COOLER TO FIT CLOSE TO BLOCK
OIL COOLER AND COOLING SYSTEM

FOR MARINE USE

by
A. J. Rankin

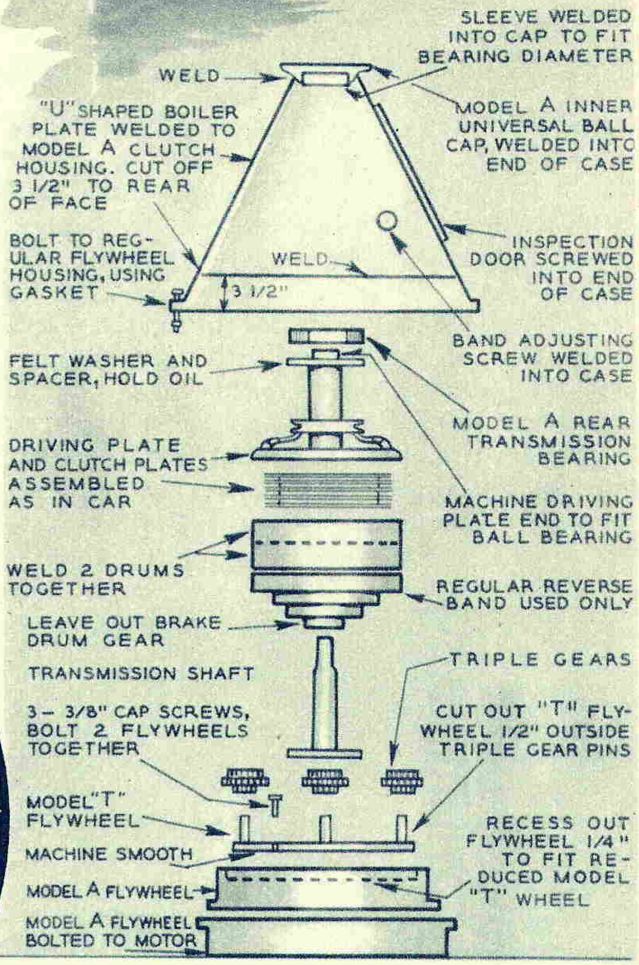


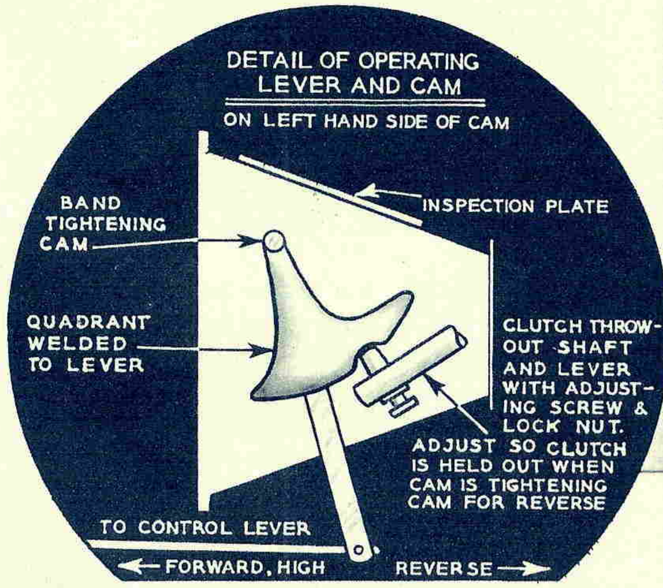
the motor to be set at any angle without the oil leaking at the rear main bearing. Be sure that all pan seams are welded to prevent leakage.

The oil pump is left as is, but it will need a longer spring to hold it up in place. Next, the inner pan with the connecting rod dips has ¾-inch high partitions welded at the rear of the two front dips, as shown. These come within 1 inch of the sides of the crankcase and allow the dip to fill with oil and flow around the ends to the next tray, keeping all filled regardless of the pitching of the boat.

The oil and water cooling system is described in the drawings. The outside oil return pipe from the rear of the valve chamber cover to the front of the cylinder block is covered with a 2½-inch brass pipe split lengthwise and slipped over the oil pipe. The seam and both ends are brazed up. This size pipe will take in the bends in the oil pipe, but will have to be fitted before welding. It will be necessary to halve the heads of two of the valve cover studs to allow the cooler to fit close to the block. One ½-inch water pipe

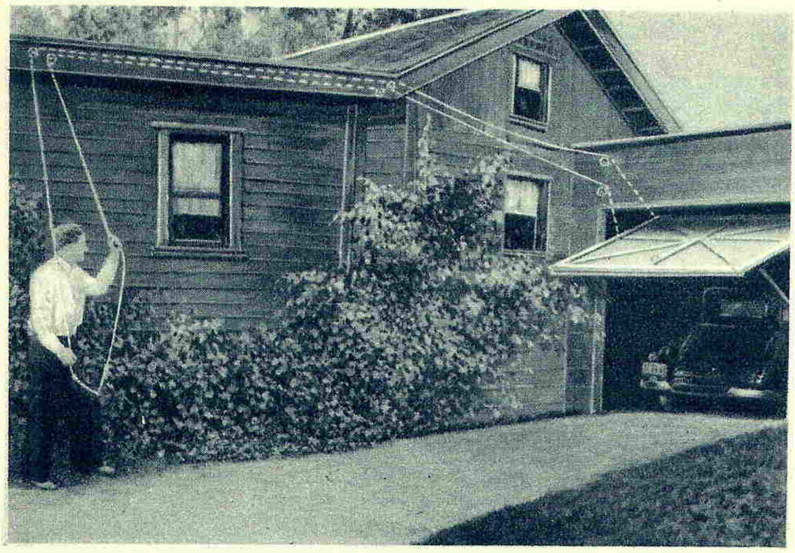
[*Continued on page* 128]


SLEEVE WELDED INTO CAP TO FIT BEARING DIAMETER
WELD
"U" SHAPED BOILER PLATE WELDED TO MODEL A CLUTCH HOUSING. CUT OFF 3 1/2" TO REAR OF FACE
MODEL A INNER UNIVERSAL BALL CAP, WELDED INTO END OF CASE
BOLT TO REGULAR FLYWHEEL HOUSING, USING GASKET
WELD
3 1/2"
INSPECTION DOOR SCREWED INTO END OF CASE
BAND ADJUSTING SCREW WELDED INTO CASE
FELT WASHER AND SPACER, HOLD OIL
MODEL A REAR TRANSMISSION BEARING
DRIVING PLATE AND CLUTCH PLATES ASSEMBLED AS IN CAR
MACHINE DRIVING PLATE END TO FIT BALL BEARING
WELD 2 DRUMS TOGETHER
REGULAR REVERSE BAND USED ONLY
LEAVE OUT BRAKE DRUM GEAR
TRANSMISSION SHAFT
TRIPLE GEARS
3 - 3/8" CAP SCREWS, BOLT 2 FLYWHEELS TOGETHER
CUT OUT "T" FLYWHEEL 1/2" OUTSIDE TRIPLE GEAR PINS
MODEL "T" FLYWHEEL
RECESS OUT FLYWHEEL 1/4" TO FIT REDUCED MODEL "T" WHEEL
MACHINE SMOOTH
MODEL A FLYWHEEL
MODEL A FLYWHEEL BOLTED TO MOTOR


DETAIL OF OPERATING LEVER AND CAM
ON LEFT HAND SIDE OF CAM
BAND TIGHTENING CAM
INSPECTION PLATE
QUADRANT WELDED TO LEVER
CLUTCH THROW-OUT SHAFT AND LEVER WITH ADJUSTING SCREW & LOCK NUT.
ADJUST SO CLUTCH IS HELD OUT WHEN CAM IS TIGHTENING CAM FOR REVERSE
TO CONTROL LEVER
← FORWARD, HIGH
REVERSE →

The marine conversion reverse gear mechanism is salvaged from a model T Ford transmission. After machining the various parts as outlined in the text assemble as shown at right. The housing for the reverse gear is a standard model A type with the hole in the bottom welded shut. A model A clutch housing is cut off 3½ inches from rear. A "U" shaped piece of boiler plate is fitted over the assembly with an inspection plate provided for easy replacing of bands.

Long Ropes Remotely Control Garage Doors



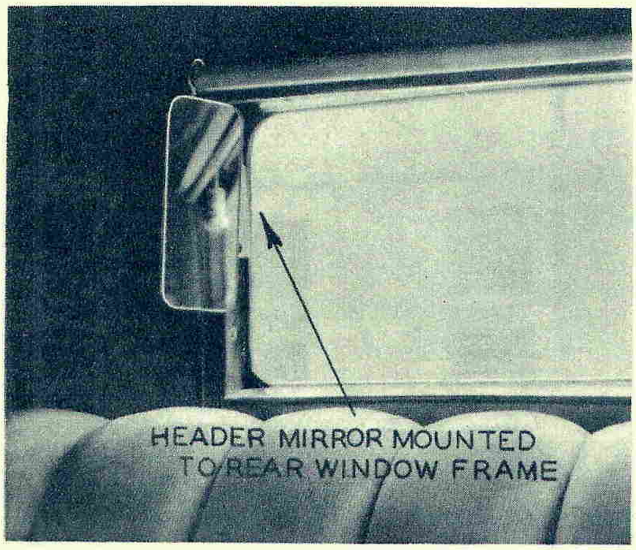
Any counterbalanced type of garage door can be conveniently opened without leaving the car. This photo-diagrammatic plan shows how ropes and pulleys are installed so as to permit the doors to be remotely opened or closed.

ANY garage door operating on a counter-balanced mechanism can be opened or closed without the driver leaving the car simply by installing the ingenious pulley system pictured in the illustration at left. By experiment determine the two points on the door where the least effort is required to open or close it and install two large screweyes. Directly over the door, in either the right or lefthand corner of the garage, mount two pulleys and through these thread two lengths of heavy sash cord, anchoring it to the screweyes in the door.

The ropes pass through holes drilled in the garage wall to a point which is sufficiently removed from the door so that it can be opened while the car is parked in front of it. Carry the ropes over two sets of pulleys mounted under the eaves of an adjoining building or to any other convenient supports. Only a slight pull on the ropes is required to open or close the door.

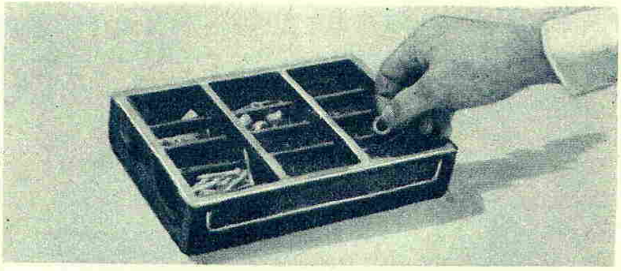
Rear Mirror Improves Vision

THE driver who is about to make a left-hand turn in congested districts can never be sure that there is not another car just behind him which is trying to pass. Should he suddenly turn the result would be that the two cars would collide, resulting in, at least, torn fenders. Considerable expense and worry can be avoided by installing an inexpensive rear vision or "header" mirror to the righthand side of the rear window frame in a vertical position. A glance in the mirror will tell the driver whether or not the road is clear. The extra mirror reflects objects not visible in the regular rear vision mirror.



The installation of an extra "header" mirror on the right side of the rear window of the car will increase the driver's rear vision considerably. It is especially useful in congested traffic.

Parts Tray From Battery Box



Worthless storage battery cases can be converted into handy small parts trays for the garage or workshop simply by cutting down the hard rubber case, with a hacksaw, to the size shown.

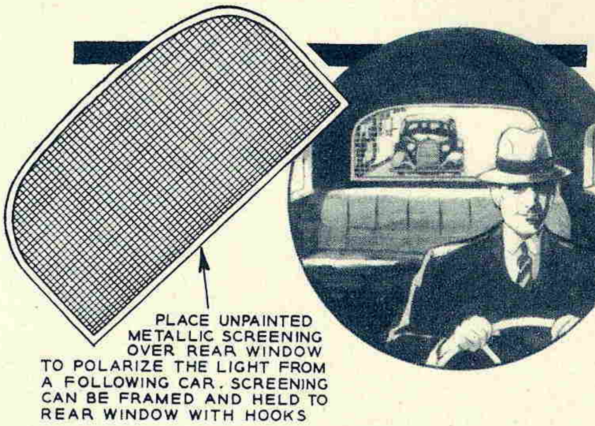
OTHERWISE worthless storage battery cases can be converted into useful small parts trays for storing nuts, bolts, washers and cotter pins, simply by sawing them down to a height of approximately two inches. Before sawing off the top, the battery case should be washed out thoroughly with soap and water to remove every trace of acid. Unless this precaution is heeded, corrosion of metal parts placed in the tray may result.

Since the battery case is divided into three-cell compartments and these into smaller plate compartments, twelve individual parts divisions result.

New and Timely Kinks for Autoists

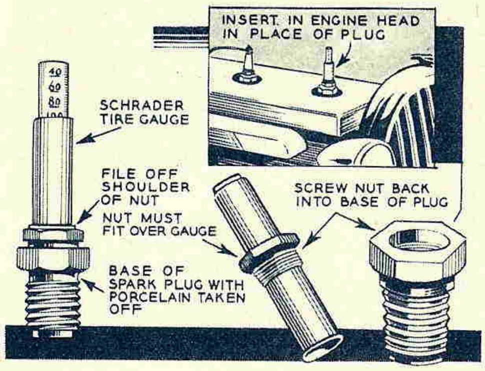
Preventing Headlight Glare

THE annoying glare of headlights from cars approaching from the rear makes night driving hazardous, especially when one is traveling over unfamiliar highways. By cutting a piece of bright wire fly screen the exact size of the rear window of the car and installing it to the frame, much of the glare can be eliminated without affecting the driver's rear vision. The screening causes a considerable portion of the headlight rays to be reflected back on the road.—C. S. Siddons.


PLACE UNPAINTED
METALLIC SCREENING
OVER REAR WINDOW
TO POLARIZE THE LIGHT FROM
A FOLLOWING CAR. SCREENING
CAN BE FRAMED AND HELD TO
REAR WINDOW WITH HOOKS

Gauge Checks Cylinder Compression

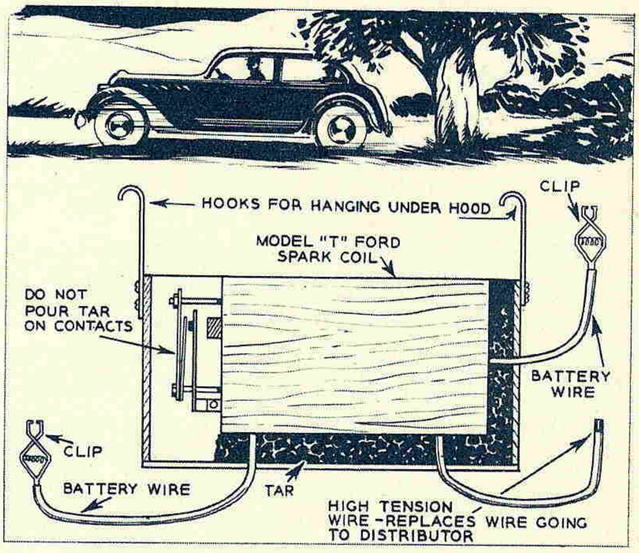
A HIGH pressure tire gauge fitted to the base of a spark plug provides the auto mechanic with an efficient device for testing the compression of auto cylinders. Take an old spark plug and remove the porcelain top, then file off the burr around the assembly nut and slide it over the tire gauge and screw it into the larger spark plug nut. To use, remove one of the spark plugs and insert in its place. Turn over engine until gauge rises to maximum pressure.—S. Zayets.

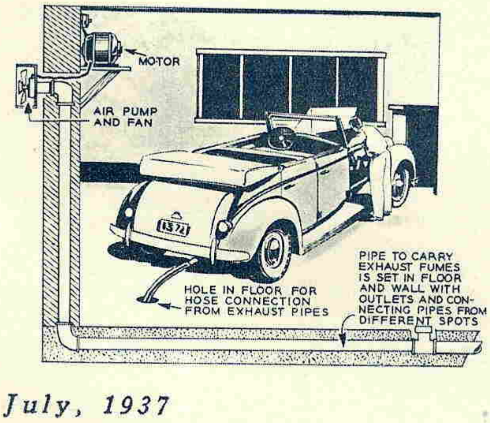

INSERT IN ENGINE HEAD
IN PLACE OF PLUG
40
60
80
SCHRADER
TIRE GAUGE
FILE OFF
SHOULDER
OF NUT
NUT MUST
FIT OVER GAUGE
SCREW NUT BACK
INTO BASE OF PLUG
BASE OF
SPARK PLUG WITH
PORCELAIN TAKEN
OFF

Ford Coil Starts Dead Motors

AN EMERGENCY ignition system that will start any "dead" car motor can be assembled from a Model T. Ford spark coil. Solder wires to the primary coil and attach battery clips to the ends. Another wire, fitted with a tip for inserting in the distributor head, is next soldered to the high tension terminal. The coil is then inserted in the box and pitch poured in to hold it in position.

To use the coil attach the clip on one primary lead to the car frame, the other to the battery side of generator cut-out and the high tension lead to center contact of distributor.


HOOKS FOR HANGING UNDER HOOD
CLIP
MODEL "T" FORD
SPARK COIL
DO NOT
POUR TAR
ON CONTACTS
BATTERY
WIRE
CLIP
BATTERY WIRE
TAR
HIGH TENSION
WIRE - REPLACES WIRE GOING
TO DISTRIBUTOR

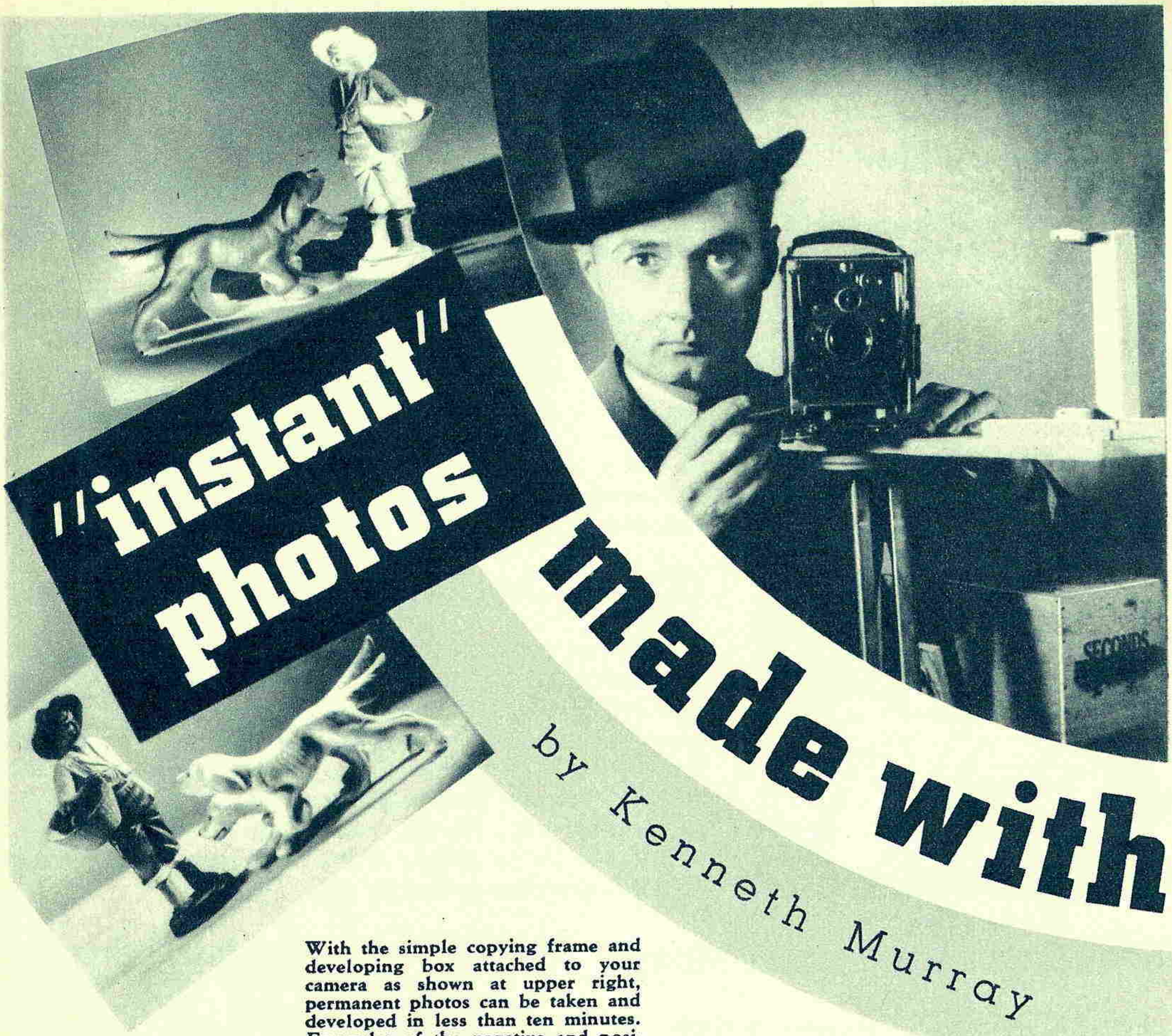

MOTOR
AIR PUMP
AND FAN
1372
HOLE IN FLOOR FOR
HOSE CONNECTION
FROM EXHAUST PIPES
PIPE TO CARRY
EXHAUST FUMES
IS SET IN FLOOR
AND WALL WITH
OUTLETS AND CONNECTING PIPES FROM
DIFFERENT SPOTS

Draw Exhaust Fumes From Garage

WHEN planning a new garage the professional auto mechanic will find this simple ventilating system well worth installing. Before the concrete flooring is laid, lengths of four-inch iron sewer pipe are connected up into a network with tee fittings installed at points where overhauling work will be handled. The end of the pipe leads to an exhaust fan for drawing out the fumes which pass from the car exhaust pipes.

"instant" photos made with

by Kenneth Murray



With the simple copying frame and developing box attached to your camera as shown at upper right, permanent photos can be taken and developed in less than ten minutes. Examples of the negative and positive, both on bromide enlarging paper, appear above and at left.

STEP right up, ladies and gentlemen, and have your picture made for a dime. In less than ten minutes you will have an excellent, handsome likeness of yourself that posterity will point to with pride. Or, build this outfit yourself and take pictures for others; 8 cents of every dime is clear profit. If you have an ordinary focusing camera and tripod the cost will not exceed a dollar, which covers the price of a copying lens attachment.

These taken-while-you-wait pictures are far better than the dull, lifeless photos made by professional one-minute cameras, which require the use of special chemicals and direct-positive paper. Instead of films or plates, the holders are loaded with glossy, medium-contrast bromide enlarging paper. You can make your own regular developer, according to the formula supplied by the paper manufacturer, or purchase it in 6-cent tubes at any drug store or camera supplies shop.

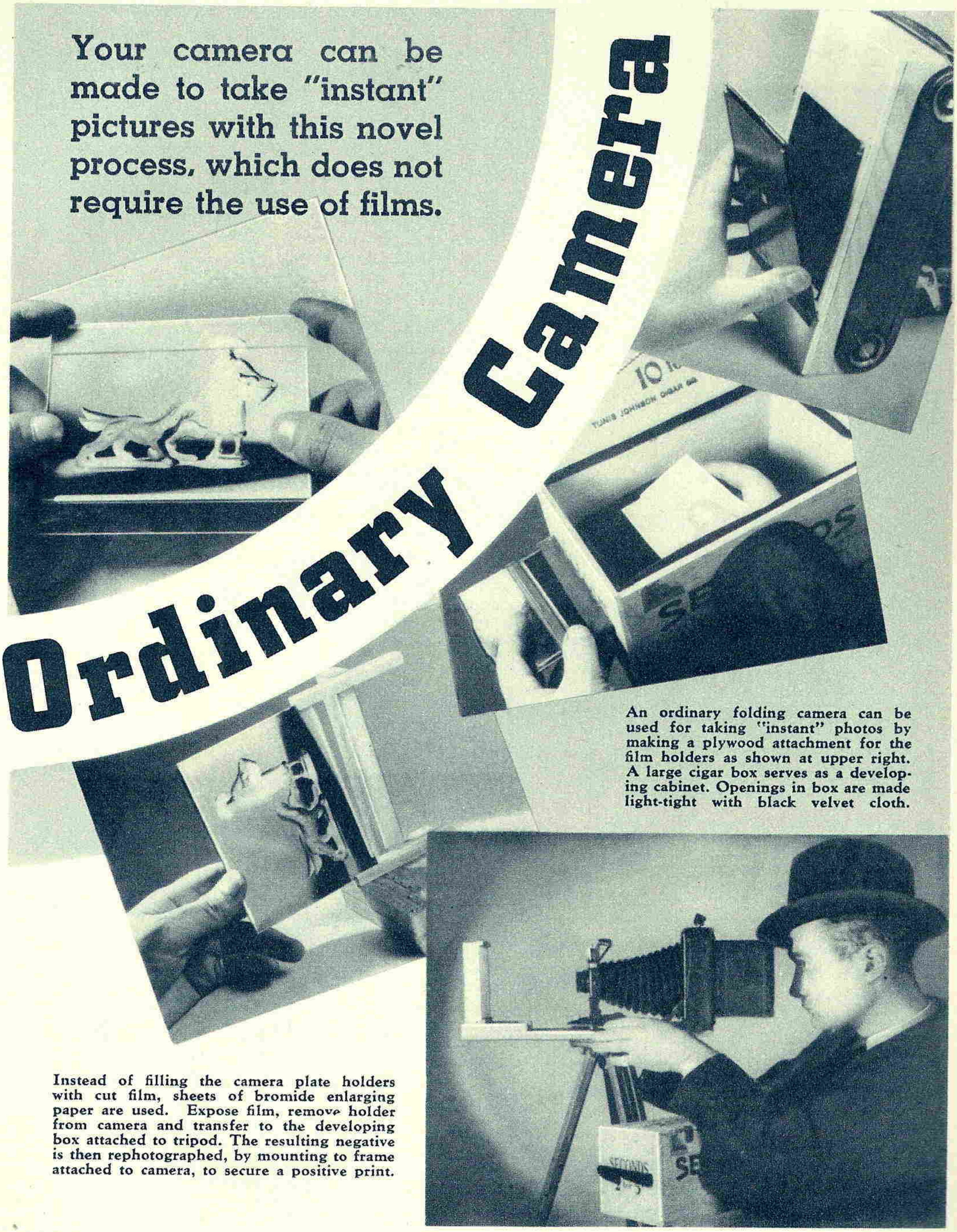
The routine of making a picture consists in the usual exposure, but on the bromide paper instead of film, as just mentioned. It is developed for one minute in a portable darkroom box attached to the tripod and then transferred to a tray of ordinary hypo fixing solution for another minute. After sandwiching the paper negative thus made between sheets of glass it is placed in a holder in front of the camera and, with a copying lens slipped over the regular camera lens, photographed onto another sheet of bromide paper to make the "positive" or print.

The positive receives the same chemical treatment as the negative and after rinsing in water it is ready for delivery to the customer. For greater permanency it may be washed for 15 minutes. As many prints as are desired may be made from the one negative.

Bromide enlarging paper has about 1/10th

Your camera can be made to take "instant" pictures with this novel process, which does not require the use of films.

Ordinary Camera



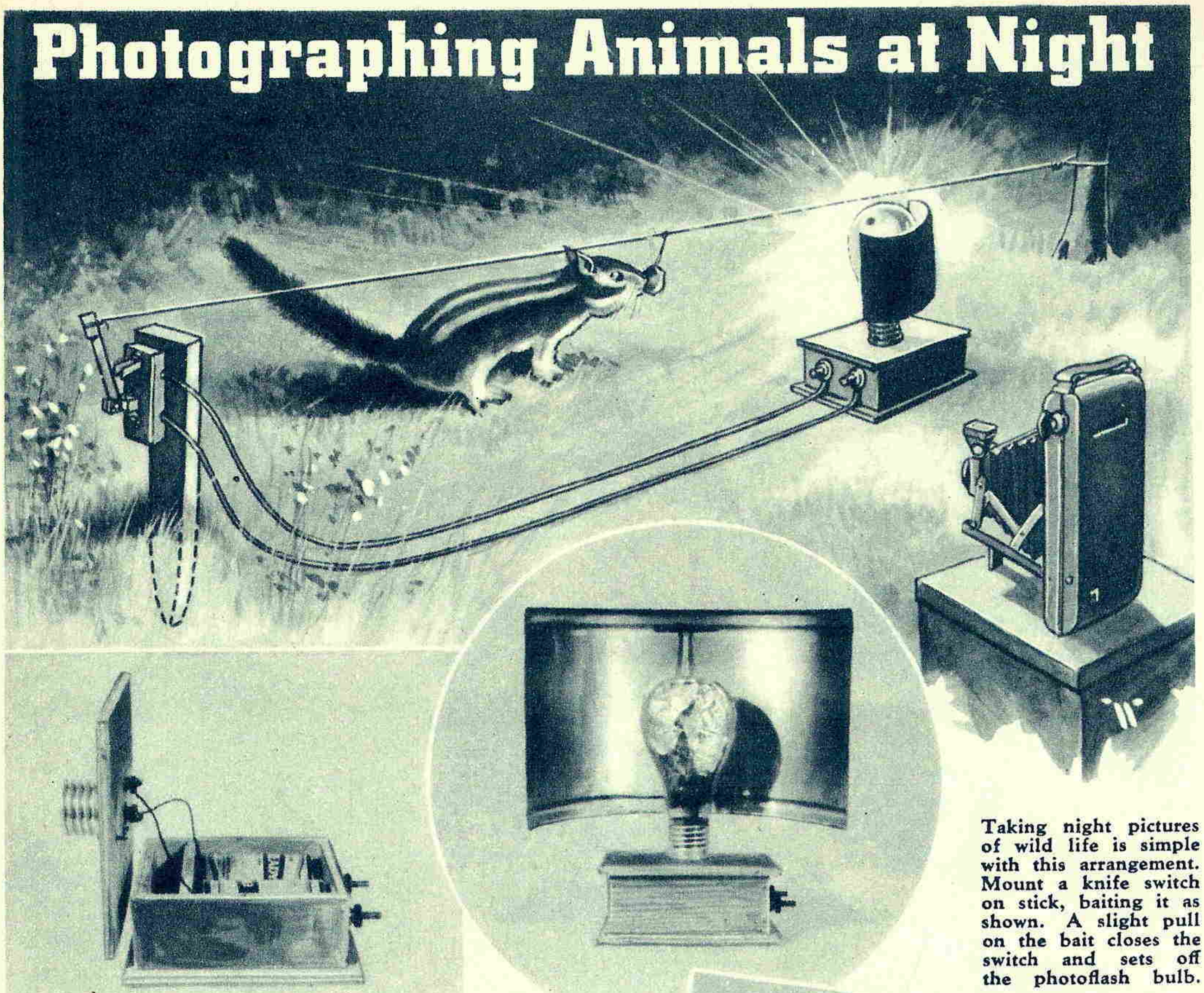
An ordinary folding camera can be used for taking "instant" photos by making a plywood attachment for the film holders as shown at upper right. A large cigar box serves as a developing cabinet. Openings in box are made light-tight with black velvet cloth.

Instead of filling the camera plate holders with cut film, sheets of bromide enlarging paper are used. Expose film, remove holder from camera and transfer to the developing box attached to tripod. The resulting negative is then rephotographed, by mounting to frame attached to camera, to secure a positive print.

the speed of regular camera film and it therefore requires ten times longer exposure. This does not mean that you must use time exposures, however. On an average bright day, fast "chrome" type camera film would require an exposure of about 1/25th second with a lens aperture of f:16. Keeping this in mind as a basis, you can figure that the bromide paper will require an exposure of slightly less than ½ second under the same conditions. Likewise, with a lens aperture of f:8, an exposure of only 1/10th second will be sufficient. This compares favorably with

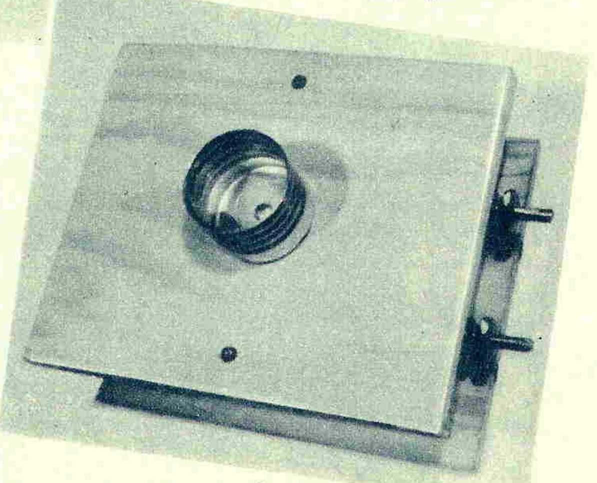
[*Continued on page* 138]

Photographing Animals at Night



Taking night pictures of wild life is simple with this arrangement. Mount a knife switch on stick, baiting it as shown. A slight pull on the bait closes the switch and sets off the photoflash bulb.

This simple plywood box fitted with a brass lamp socket contains two flashlight cells for setting off the photoflash bulb. Mount tin reflector to bulb as shown in circle.

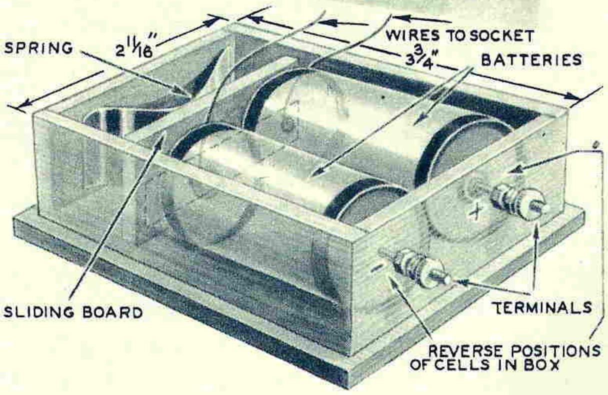


THE amateur as well as the professional photographer can get good wild animal photographs at night. The subjects may range from mice and shrews to opossums, weasels, skunks and other nocturnal animals who are rather difficult to photograph in the daytime. In fact, the common house mouse and the alley cat are also interesting subjects for photography.

The best way to take these pictures is to set a "photoflash trap" whereby the animal, taking the bait, sets off a photoflash bulb with the camera focused on the bait and with the shutter open.

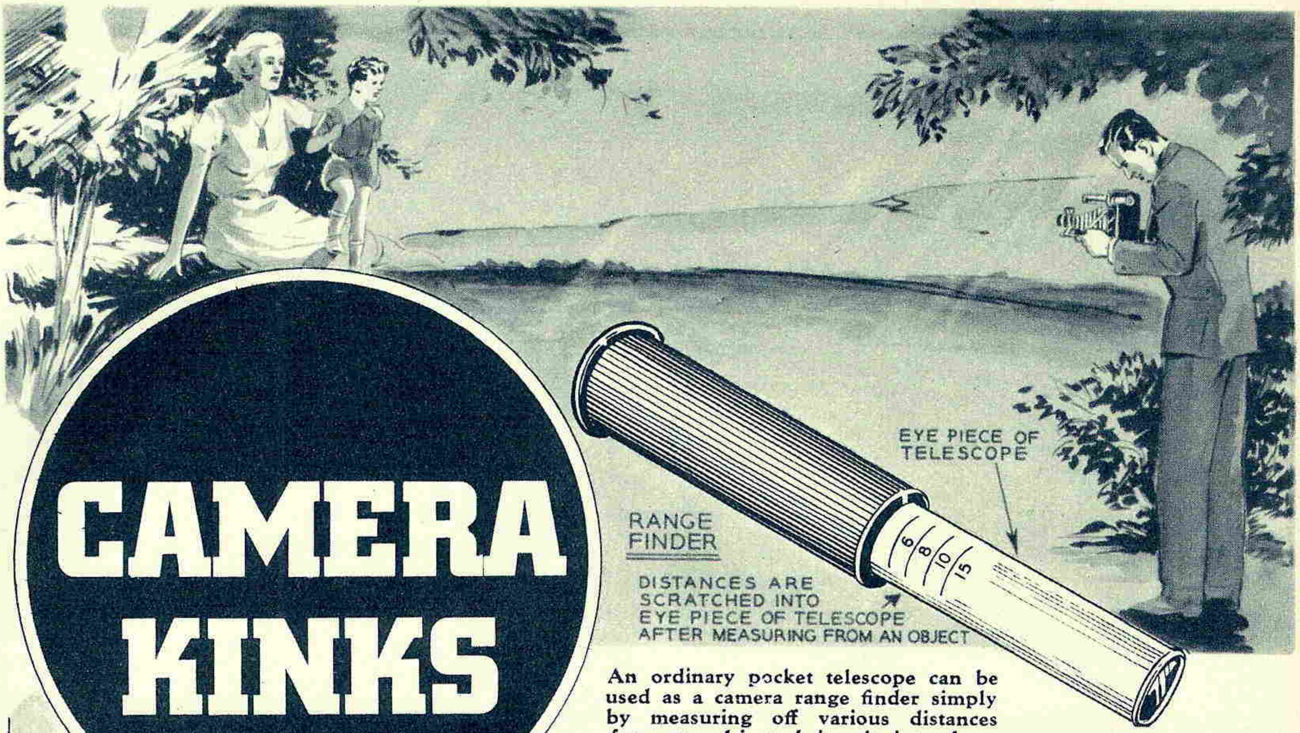
The simple apparatus described here is excellent for taking "automatic" pictures of

[*Continued on page* 132]

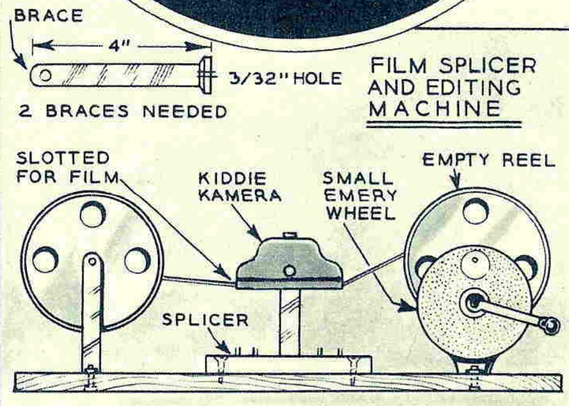


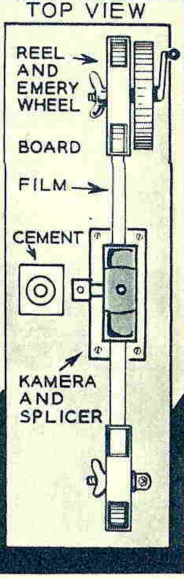
The simplicity of the battery box is shown in the phantom view at right. Cells are mounted in reversed positions in box with a spring clip, sliding board to hold them secure. Leads from the lamp socket connect to thumb tacks on sliding board.

CAMERA KINKS

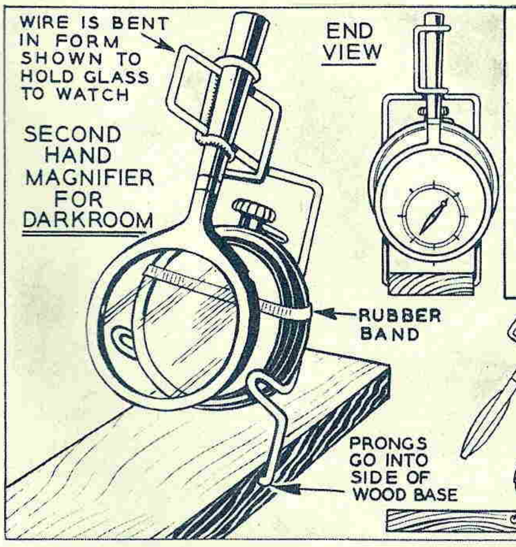

EYE PIECE OF TELESCOPE
RANGE FINDER
6
8
10
15
DISTANCES ARE SCRATCHED INTO EYE PIECE OF TELESCOPE AFTER MEASURING FROM AN OBJECT

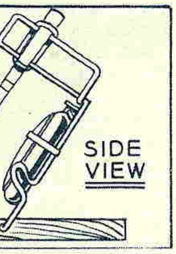
An ordinary pocket telescope can be used as a camera range finder simply by measuring off various distances from an object, bring it into focus with the telescope and enscribing the number of feet on the barrel of the telescope. When taking pictures with your camera adjust telescope until object is in proper focus and note reading.


BRACE
4"
3/32" HOLE
2 BRACES NEEDED
FILM SPLICER AND EDITING MACHINE
SLOTTED FOR FILM
KIDDIE KAMERA
SMALL EMERY WHEEL
EMPTY REEL
SPLICER

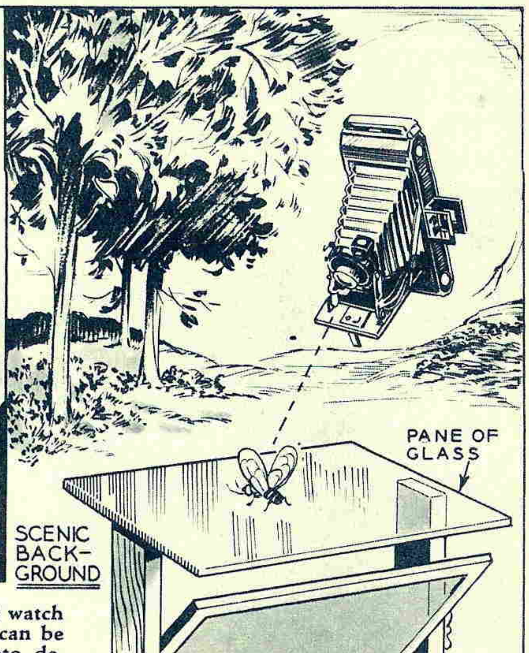

TOP VIEW
REEL AND EMERY WHEEL
BOARD
FILM
CEMENT
KAMERA AND SPLICER

Designed for home movie fans, this novel film editing machine can be assembled for less than $1. Get a cheap bench grinder, remove the grinding wheel and replace it with a film reel. Mount the grinder on one end of a 12" plank and a strap iron bracket on the opposite end for the full reel. The examining device, mounted in the center, consists of a "Kiddie Kamera," such as sold in ten-cent stores.


WIRE IS BENT IN FORM SHOWN TO HOLD GLASS TO WATCH
SECOND HAND MAGNIFIER FOR DARKROOM
END VIEW
RUBBER BAND
PRONGS GO INTO SIDE OF WOOD BASE

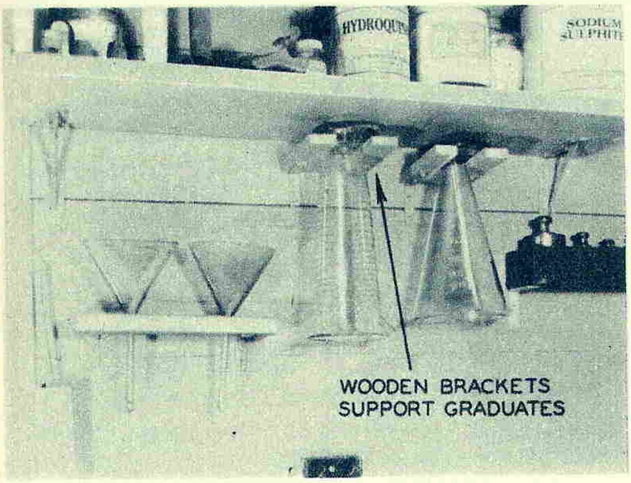


An inexpensive pocket watch having a second hand can be used for accurate photo developing timing simply by mounting a large reading glass in front of the face. Mount the watch on a stand formed from coathanger wire in the manner shown at left. A projection on the top of the stand permits the mounting of the reading glass.


PANE OF GLASS
SCENIC BACK-GROUND
THUMB SCREW
MIRROR REFLECTS SCENE IN FRONT IN TO GIVE NATURAL BACKGROUND

Photographing biological specimens on a natural background can easily be accomplished with the reflecting table described above. It consists of a stand on which is mounted a clear pane of glass for placing the specimens. Directly underneath the glass mount a mirror, fitted with a pair of bolts and wing nuts on each end, so that it can be adjusted to any desired angle. To photograph an insect, place it in the center of the clear glass pane, adjust the mirror to the correct angle for reflecting a suitable background and snap the picture. Care should be exercised so that the glass pane does not produce any extraneous landscape reflections.

Darkroom Aids For Amateur Photographers



Rack Prevents Breaking

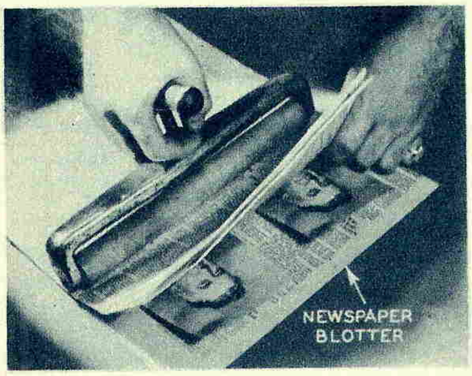
TO MAKE a simple, foolproof support for a glass graduate in the chemical laboratory or darkroom, cut a U-shaped opening in a block of wood, just large enough to take the thin section above the base and mount this to the wall, preferably under a shelf, by means of two small iron brackets that have been spread open a bit.

In this inverted position, the graduate will drip clean after being washed, will not gather dust and will not be knocked over inadvertently in the dark.

Candle Stops Frilling Of Film Edges

WITH some types of film developers containing a large percentage of alkali, and especially when the solution is very warm, photographic films are subject to "frilling" or detachment of the emulsion from the celluloid support around the edges. This can be prevented by the simple expedient of rubbing a wax candle around the edges of each film before placing it in the developer. The slight amount of wax adhering to the edges prevents the gelatine from becoming too soft.

RUB EDGE
WITH CANDLE

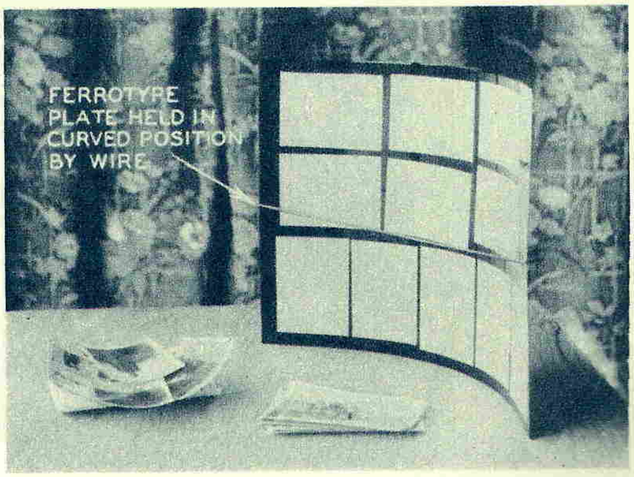


Newspapers Make Substitute Blotters

CLEAN newspapers that are a week or more old, so that the ink will not offset, make excellent blotters for drying matte-finish photographs. Glossy prints can also be dried in this way if it is not desired to secure a high-gloss finish. Unlike expensive blotting paper, newspapers do not deposit lint on the prints. In addition they can be thrown away after once being used, instead of being stored and allowed to accumulate dust and dirt.

Bent Ferro-plate Dries Prints

GLOSSY photographic prints show much less tendency to curl if they are dried on a ferrotype plate bent to provide a curved surface. Prints dried in this manner, when compared with similar ones dried on a flat plate, are considerably flatter. The prints are given a backward curl which disappears, leaving them flat or with a very slight forward curl. The plate is held in shape by a piece of stiff wire with each end bent to form a hook or by a loop of cord passing around it.



See the Other End of the Highway

from the saddle of a HARLEY-DAVIDSON

You don't have to WISH you could see the glorious sights at the other end of the road — and along the way — when you own a Harley-Davidson. Just hop into the saddle and SEE them! No set schedules to follow — go when and where you please — even ride the trails to out-of-the-way places where trains and autos can't go. Boy, that's the life! Go places and see things — on a new 1937 model that's got everything you could ever wish for in style, power, speed, and riding ease—plus *amazingly low-cost mileage*. Many remarkable motor improvements and streamlined design!

See your Harley-Davidson dealer RIGHT AWAY—for a FREE RIDE — and details of his Easy Pay Plans. And send in the coupon — NOW!

HARLEY-DAVIDSON MOTOR CO.
Milwaukee, Wis.

HARLEY-DAVIDSON
Department MM

MAIL THIS COUPON

HARLEY-DAVIDSON MOTOR CO.,
Dept. MM, Milwaukee, Wis.

Interested in motorcycling. Send illustrated literature. Postage stamp is enclosed to cover mailing cost.

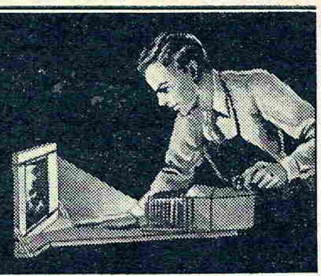
Name ....

Address ....

My age is ☐ 16-19 years, ☐ 20-30 years, ☐ 31 years and up, ☐ under 16 years. Check your age group.

Ride a HARLEY-DAVIDSON

AMATEUR PHOTO PUZZLERS



In this department the Photography Editor will answer any question or problem relating to cameras of all types, enlarging, printing, developing, taking pictures, and the various phases of home movie making. When sending questions to this department, be sure to include a stamped, addressed envelope, so that we can answer directly in case space does not permit publication of the question on this page. Send all inquiries to the Photography Editor, Modern Mechanix, *1501 Broadway, New York, N. Y.*

NEGATIVES FAIL TO DEVELOP

In my first attempt to develop a roll of snapshot film my results were very disappointing. After the developing and fixing operations the film showed nothing but a dull cast. No images were visible. Before attempting to develop any more films I would appreciate an explanation regarding the cause of the trouble encountered with the first roll. Can you offer any helpful suggestions?—Stephen Moodovaurey, Ft. Mead, Md.

If your films were opaque after being developed they were, in all probability, light struck. It must be remembered that in developing films the room in which the developing operation is carried out must be totally dark, except for the safelight and this should be placed some distance from the developing trays.

There are several other factors that will result in similar effects. The use of stale developing powders and hypo that has been stored in a warm place will often ruin a good roll of exposed films. Failure to develop negatives for the prescribed period of time, dirty trays, insufficient washing and poor working facilities are, all too often, the cause of disappointing results. Before attempting to develop additional rolls of film we would suggest that you procure a copy of the book, "How To Make Good Pictures," which covers the topic of amateur picture making from A to Z. Copies of this 224 page photo encyclopedia can be obtained from the Photography Editor for 50c postpaid.

COPYING ILLUSTRATIONS FROM MAGAZINE COVERS

Is it possible to copy illustrations from newspapers and magazines with a good quality snapshot camera? At the present time I am interested in making a photographic collection of magazine covers and would like to use my camera for this work if some arrangement for doing this is possible. Any particulars you might care to offer would be welcomed by me.—Harry J. McLatchy, Arlington, Mass.

Even the inexpensive box camera can be used for copying newspaper and magazine illustrations by fitting it with a copying adapter lens. Since you possess a snapshot camera of the more expensive type it is well suited for copying work. Your photographic dealer can supply a suitable lens for copying purposes at a cost of 50c. The adapter in which the copying lens is mounted slips over the original camera lens housing, the bellows are adjusted as prescribed in the instructions packed with the lens. To make copies of illustrations, place the page on which they are printed in an absolute vertical position and the exact distance from the camera lens as given in the instructions for using the copying adapter. Exposures of printed matter can be made by the time or instantaneous methods depending on the amount of light available.

A method for making photographic copies with a spectacle lens was described in the November, 1936, issue of Modern Mechanix.

For more detailed instructions we suggest that you refer to that issue.

REMOVING GREASE FROM MOVIE FILMS

Do you know of a solution that will remove grease and dirt from home movie films. After the reels are used several times the oil from the claw mechanism gets on the film and a considerable quantity of dirt particles collects on the surface. These particles naturally show up on the projected pictures and prove very annoying.

Is there a preparation on the market for removing the accumulation of grease without harming the emulsion?—P. M. Ohlinger, Portsmouth, Iowa.

Grease can be removed from home movie films by applying carbon tetrachloride or alcohol to the affected surfaces with a soft cloth and rubbing away the grease deposits with light, even strokes. If handled carefully, the cleaning solutions mentioned will have no harmful effects on the emulsion.

STRENGTHENING WEAK NEGATIVES

I have a number of negatives that produce very weak prints. Inasmuch as the subjects are highly valuable to me I would like to secure better prints if this is at all possible. Would the use of a very sensitive printing paper give me the desired results or must the negatives be treated in some manner so as to provide more contrast?—Arnold Kay, Mt. Penn, Pa.

Weak negatives can be intensified, so that satisfactory prints can be obtained, by re-developing. Place the films, first, in a bleaching solution for one minute then remove and wash thoroughly in water. Next, place them in the re-developing powders solution, which your photo shop can supply and allow them to remain in the chemical bath for one-half minute. After removing from the re-developer, place the films in a hardening solution for five minutes and finally wash off all traces of chemicals with clear water. The films, if thus treated, will show a decided increase in contrast so that good prints can be made from them.

AMATEUR PHOTO AWARD

The unusual silhouette tree scene, shown at top, was taken against the sun with a camera fitted with a color filter. A 1/50 second exposure on SS Panchromatic film was used in taking this photograph which won this month's $5 amateur photo award for Frederick Lloyd of Port Hope, Ont., Canada. The amusing picture of a young burro peering into the surveying instrument was submitted by E. C. Romick of Medford, Utah. His snapshot received MM's $3 second prize award.

The photography editor will pay $5.00 or $3.00 each for photographs interesting enough for publication on this page. All pictures should be mailed to Modern Mechanix, 1501 Broadway, New York, N. Y.

Inexpensive, Simple to use—*and how they step up your Picture-Taking Skill*

KODAK PORTRAIT ATTACHMENT

The ordinary hand camera is not designed to take pictures at extremely short distances. But a Kodak Portrait Attachment slipped over the lens of your Kodak or Brownie keeps the image sharp.

You can make "close-ups" of your family and friends, as well as clear-cut, close-range pictures of flowers, art objects, and still-life subjects in general.

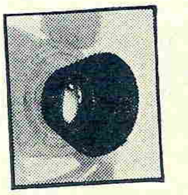
The attachment slips quickly over the regular lens. And the camera is operated as usual. Price, for most current camera models, 75¢.

KODAK SKY FILTER

Slipped over your regular lens, it holds back the light from the blue sky, and gives you beautiful cloud effects. The darker portion of your picture, the landscape, gets full exposure. Price, depending on camera, $1, $1.50, $3.30.

KODAK COLOR FILTER

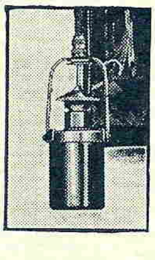
Holds back blue and violet rays reflected from highly colored landscapes, gives weaker shades time to register. With it black-and-white pictures render all colors more nearly as the eye sees them; they're more natural. Price, depending on camera, $1, $1.50, $3.30.



KODAK ADJUSTABLE LENS HOOD Prevents "lens flare" in bright light, in making artistic back-lighted shots. Two sizes, 85¢ and $1, depending on diameter of lens or lens attachment over which hood is to be used.

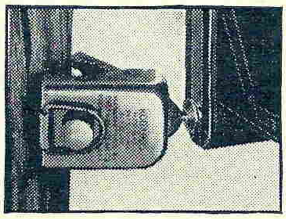
KODAK METAL TRIPODS

Light, compact, rigid; fit any standard tripod socket. Sections telescope neatly to give small collapsed size without sacrifice of strength. Three models, ranging from 13½ to 15½ inches long, closed. Nos. 1 and 2 have revolving heads; camera may be swung in any direction. Prices, No. 0, $2.75; No. 1, $4.50; No. 2, $5. Rubber tips, to cover metal spurs for indoor use, 10¢ for set of three.



KODAK SELF TIMER

Lets you get in the picture yourself. You clip it to cable release, set it, and, in a sufficient time interval, the shutter is automatically tripped. Price, $1.25. Cable release (specify name of camera) 35¢ additional.

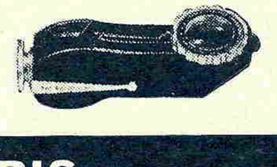


THE KODAPOD

Toothed jaws grip tree or fence, other end threads into any standard tripod socket. Clamping screw adjusts camera to correct position. Carried in coat pocket. Price, $1.75.

KODAK POCKET RANGE FINDER

Used with any camera that has a focusing scale. Look through the eyepiece, turn the knurled ring until the two halves of the image are perfectly matched, and there's your correct distance, indicated by a pointer. Set for that distance, and subject is in focus. Spring pocket-clip. Price, $7.



SEE THEM AT YOUR DEALER'S

Eastman Kodak Company, Rochester, N. Y.

Carleton Ellis, Chemist

[*Continued from page* 57]

of providing the money to carry on his investigations.

The first profitable invention made by Mr. Ellis, conceived at the age of about twenty while on the instructing staff at Massachusetts Institute of Technology, consisted of the paint and varnish removing compound as sold everywhere today. The reason he invented it: he was determined to start up some business in which he would be his own boss and do the work he dearly loves—that is, delve into chemical phenomena. Carleton Ellis is a living example of what one can accomplish in the fields of science through independent, personal effort.

Chancing upon a workman removing paint gave Ellis the idea for his paint remover. The workman first scrubbed the surface with caustic soda; it removed the paint but left the wood dark. Then he proceeded to bleach the wood with oxalic acid. "Here is an opportunity," young Ellis said to himself. "I'll concoct a chemical which will permit removal of the paint without discoloring the wood." And he did it.

Under an old shed, with three barrels for equipment, and a borrowed $500 for capital, Ellis began manufacture of the compound, while two of his college companions sold it from place to place. While operating under such limited capacity an order came from the Pennsylvania Railroad for a carload of the Ellis paint remover!

A perfect paint and varnish remover was the object of Ellis' early research, for in those days most coatings were short-lived and required frequent renewing. Now suppose, the young chemist reasoned, someone should perfect a durable coating material, then the demand for my remover would collapse. Why not play safe and go to the heart of the problem by improving the paint itself? Perhaps a lasting paint could be developed with less effort than a perfect paint remover? Time has revealed that the young chemist did not realize the gigantic task he was laying out for his goal. Though in thirty years, Ellis has made many improvements in paints and lacquers, the effect of which has revolutionized the industry, what he considers the perfect paint has not yet been found. Without wincing he continues his search.

Having tried all known natural oils and resins without obtaining a perfect paint, Ellis resorted to making resins synthetically—making compounds which nature has never brought together in just the right proportions and conditions to permit chemical union—in the belief that he thus could obtain products superior to those of nature. Running anywhere from ten to twenty new synthetic resins and compositions daily, Mr. Ellis has produced well over 100,000 new products. Yet the end he set as his goal has not been reached. While his synthetic creations give an improved paint, out of the entire lot there is not a single compound which he considers perfect. If the compound possesses the necessary hardness, perchance it may be found too brittle or incapable of withstanding heat; if it be moisture proof, perchance it may lack color appeal; if it is easily workable, perhaps its cost is prohibitive.

To convert waste and cheap materials into new and useful things requires true genius. While in Germany Ellis was shown stored 50,000,000 pounds of synthetically made urea, a chemical having the appearance of salt. It was being sold for fertilizer, but the market was slow. Ellis had been thinking of a new use for it—urea formaldehyde is the result. Ellis made this important plastic or molding material by mixing four familiar colorless gases—ammonia (used about the household for cleaning), carbon dioxide (which we exhale), carbon monoxide (which automobiles exhaust), and hydrogen. "Why, I consider that almost a miracle of creation," an awe-struck guest remarked after witnessing the process.

Today urea formaldehyde may be seen at every hand; for example in toilet articles, clock and radio cases, dishware, tiles, and buttons. Because it is non-inflammable and non-fading while available in a wide range of brilliant colors, it has about supplanted celluloid except for photographic films. It has largely taken the place of hard rubber. Several corporations now market urea plastic under license of Ellis' patents.

"This is all a good point for young chemical inventors to note," said Ellis. "Business sense is just as essential to the successful professional inventor as is enthusiasm for research."

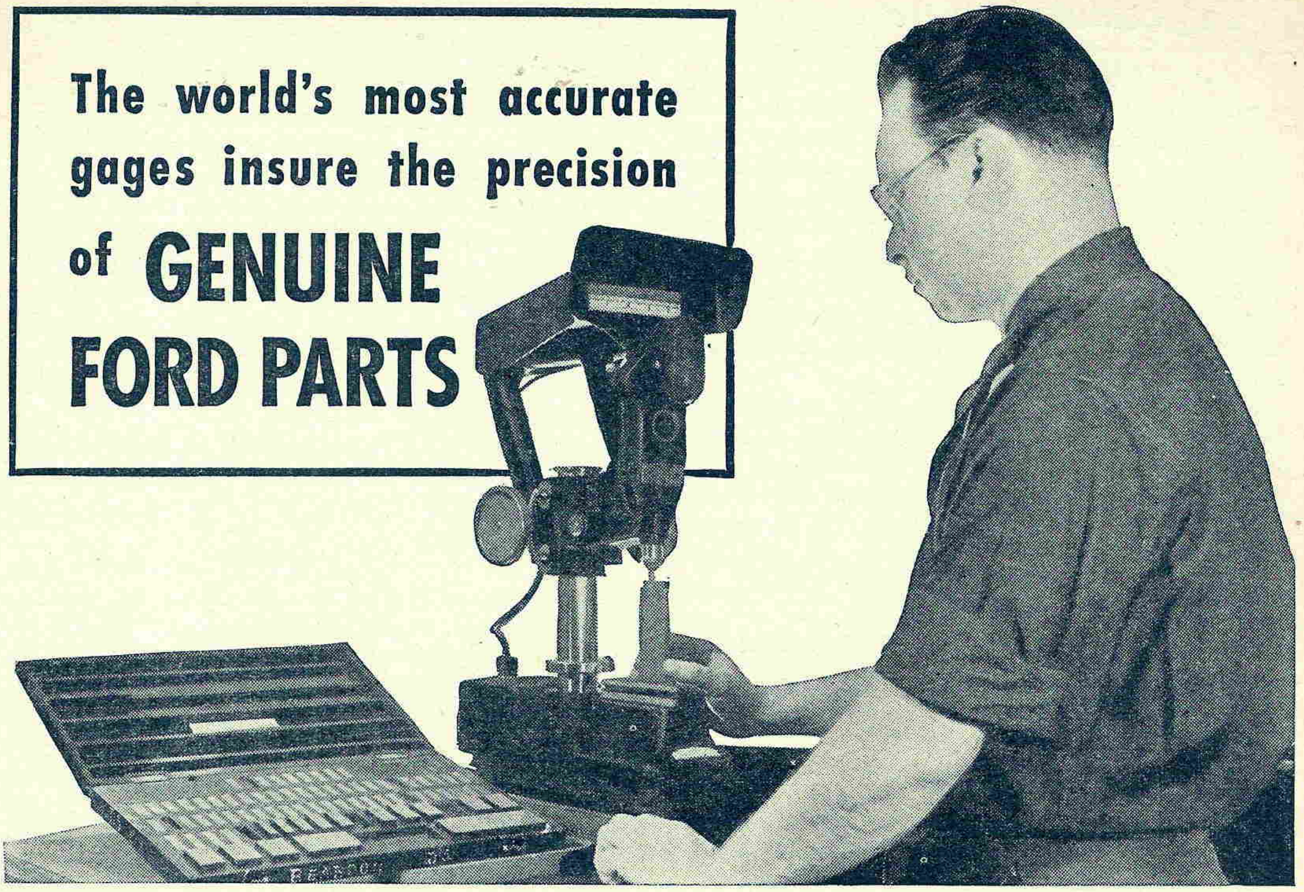
The dog biscuit is a case where Ellis turned waste into a profitable industry. Seeking a use for the waste products of his industry, the owner of a slaughter house once called upon Ellis for help. After reflecting, Ellis mixed the waste with malt and other healthful food ingredients, and baked it into nice flat cakes. To his dismay, Fido would have none of it. "So I baked some more of the same stock, but in the shape of a bone," Ellis relates, "and I found that my dog manifested a tremendous interest in the bone-shaped biscuit. To this day I cannot tell whether my dog is interested in the bone-shaped biscuit because it fools him as such, or whether, after my shaping the biscuit in an effort to cater to his taste, he feels duty bound to fool his master by simulating an interest in it. In any event, the artifice works, and that is the true story of the start of the dog biscuit industry.

Mr. Ellis has performed magic in the field of petroleum. One of his outstanding inventions in this art was the development of the "Tube and Tank process" of cracking oil used by the Standard Oil and other leading companies. Mr. Ellis has done much in developing a Diesel motor fuel suited to the Diesel operated streamlined trains and Diesel propelled boats.

He took paraffin from petroleum, converted it into a fat substitute and then made soap out of the product. Believe it or not, the soap will lather

[*Continued on page* 122]

The world's most accurate gages insure the precision of GENUINE FORD PARTS



Inspection gages of all types are set accurately by means of Johansson Gage Blocks at the Ford Plant in Dearborn, Michigan.

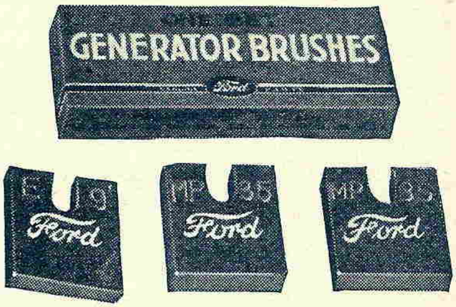
Precision manufacturing is one reason why you can depend upon Genuine Ford Parts to fit properly — to last longer. For example, you can depend upon camshaft bearings and push rods to measure within five ten-thousandths of an inch (.0005") of specified size, and valve stem diameters to vary not more than one one-thousandth of an inch (.001").

In making Genuine Ford Parts, extreme precision is maintained by the use of Johansson Gages — gages made by Ford Motor Company in the United States and so accurate that they have been accepted as the world's standard of linear measurement. These gages are accurate within two millionths of an inch (.000002") of specified sizes.

And quality is just as outstanding as precision manufacturing. Genuine Ford Parts are made of the highest quality materials. 36 kinds of steel are used — each steel of a special type to meet a specific need.

When replacement parts are needed, remember that you can get the same precision and quality that was built into your Ford car or truck at the factory only by using Genuine Ford Parts. Get them from any Ford dealer or from any garage that displays the sign "Genuine Ford Parts."

FORD MOTOR COMPANY
Dearborn Michigan



Even texture, correct hardness, uniform resistance and long life are features of Genuine Ford Generator Brushes. Per set of three, 18c.

OIL PAN GASKET UNIT

All prices subject to change without notice.

Genuine Ford Oil Pan Gaskets are made of a treated cork fiber material that has high tensile strength to insure resistance to tearing. They pass rigid absorption, compressibility and weight tests. 10c each.

Genuine Ford Starter Springs are made of special high-carbon steel. Close tolerances insure alignment between screws, shaft and drive-head. 55c each.

STARTER DRIVE SPRING

Exposing Counterfeiters

[*Continued from page* 38]

stamps of the early Italian and German states. These nations, in case you don't recall offhand, once were divided into various states—before the turn of the century—and stamps in those days were issued usually by the states and not by the national government. Saxony, as a German state, for instance, started issuing stamps about 1860 and most of the fine counterfeits of Saxony issues, in the world today, were made between 1860 and 1870.

What American stamps have been counterfeited mostly? The 1894 and 1917 two-cent varieties, Mr. Robinette says. Both of these illegal issues were made specifically to defraud the United States government, rather than to bamboozle collectors. Secret Service sleuths located both agencies making these fakes and quickly put them out of business.

The bogus '94 two-cent stamp was red in color with a profile of George Washington on its face. Thousands were foisted upon the unsuspecting American people, Mr. Robinette recalls. Careful study of some of these fakes convinces him that they were imitated first by means of a clever photographic process and later engraved. This was likewise the case, he believes with the 1917 two-cent counterfeits.

Confederate stamps have been widely imitated, Mr. Robinette says. "The best counterfeit I know about is the little five-cent blue Jefferson, issue of 1862. Genuine copies today catalogue at only 30 cents. The surest way for the average collector to identify the fraudulent variety is by comparing the sizes of the real stamp and the suspected one. The fake, in nine cases out of ten, will prove to be a trifle smaller."

Oddly enough, the largest-scale counterfeiting business Mr. Robinette ever heard about was conducted in a semi-legitimate way. In other words, the "big shot" involved admitted, yes, even advertised, that he was making fakes, but said he was doing so because many collectors liked to include a number of good fakes in their collections. He was a Swiss with headquarters in Berne. He had the finest types of stamp-making equipment, including printing presses, perforating machines, color processes and all varieties of gum. He was almost a genius in his line and claimed that he could imitate practically every one of the early European stamps. When did he operate? Way back in the period roughly between 1870 and 1880.

This amazing individual made other peculiar assertions. He claimed he manufactured "phonies" mainly for the sheer fun of it and made very little profit. However, he did a tremendous business and sold to thousands of people all over the world. Always he insisted he never sold a single counterfeit with the deliberate intent to deceive. Maybe not. But scores of shyster dealers obtained some of his finest specimens, directly or indirectly, and cashed in handsomely on them. Today no one seems to know whether or not Swiss authorities ever actually clamped down on his activities.

Do you know what a surcharge is? Even the rankest novice collector can tell you. In stamp circles it usually means that the official manufacturing agency changes the country of issue by means of an "overprint," which is some fairly simple identifying mark such as the marking of the face of the stamp with a name or a numeral.

Another form of surcharge involves, in similar fashion, a change in the regulation postal rate. This might mean, for instance, a 2½-cent overprint on a 5-cent stamp. On the other hand, a surcharge might involve a change in the type of postal service. There are, for example, special surcharges used for making special deliveries out of ordinary stamps, or for some particular revenue purpose.

There's a tremendous field in counterfeit surcharges, according to Mr. Robinette, of the so-called French Colonial "provisionals." The fakers make a practice of buying, at extremely low rates, a number of the genuine French stamps, which are fairly common, by the way; whereupon they imitate the rare surcharges. For the expert this is easy, since the early surcharges were printed on the face of a stamp in very crude fashion, or else merely stamped on by hand.

All the French colonial governments surcharge their stamps by putting the word *Obock* on a freshly made sticker. The counterfeiters do the same thing, Robinette says, and oftentimes it's next to impossible to detect the fraud, so expert are the fakers in their illegal art.

Many of the early French Colonials have a high catalogue value today, notably the so-called Martinque and Madagascar varieties. For instance, the famous "Majungo" issue of Madagascar—1895 to 1896—list at from $50 to $600 apiece. Their surcharges have been widely and beautifully imitated.

Mr. Robinette has noted many fakes of the famous 1834 issue of the so-called "Bull's Eye" of Brazil. These are the first general issue stamps known in the Western Hemisphere. They are engraved stamps, are black in color and have enormous letters on their faces, which fact accounts for their unusual nickname. "Bull's Eyes" were made in three values only: 30, 60 and 90 reis. Some of them today rate a high catalogue value. The 90-cent ones list at $150 uncancelled, and $40 cancelled. Most of the other Brazil varieties are considerably cheaper on the collector's market.

Can an expert dealer be fooled? Not very easily, Mr. Robinette claims. He could be most readily taken in, he admits, with an especially fine imitation of the so-called No. 1 Saxony, an early German Colonial. This is a lovely stamp, red in color, bearing the large numeral 3 in a square. There are innumerable fakes of this on the market, printed almost precisely like the original. The best test for determining them

[*Continued on page* 149]

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-richer aroma
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Here is a golden opportunity for Agents. Many of your friends are prospects for a Sportcycle.

Carleton Ellis, Chemist

[*Continued from page* 118]

freely in ocean water. Stranger still, it will not leave a ring about the bath tub.

Another of Ellis' discoveries in connection with petroleum reads somewhat like a miracle. It will be recalled that during the War the wings of airplanes of the United States and its Allies were frequently set afire by incendiary bullets, whereas the German plane wings were non-inflammable. This difference was due to the fact that the cloth covering of the German planes was impregnated with cellulose acetate, whereas our planes had to be coated with gun cotton through lack of acetone—the conventional solvent for cellulose acetate. A plea for acetone was sent out from Washington to the chemical profession. Mr. Ellis at the time the plea was received was in the midst of his experiments leading to the separation of isopropyl alcohol from petroleum. Reverting to the formulae of his notes Mr. Ellis saw intermingled therewith the acetone formula. "It literally jumped out at me from the petroleum formula," he later related. "It was the first time in my career that an invention came easily." A test run was made, yielding about ten gallons of pure acetone The War Department was notified. The chief of the Signal Service, Chemical Warfare, rushed to the Ellis Laboratory at Montclair, to verify the claim. The process was repeated to his amazement, which he accepted with doubt, saying "there must be a "nigger" in the wood pile somewhere." Nevertheless for the duration of the War all the acetone required by Uncle Sam was produced in a small plant Ellis had previously built at Bayonne, N. J.

Carleton Ellis looks the clever inventor and metropolitan business man that he is. Still in his fifties, his step is spry to the point of being youthful. The courteous, mild manner of Carleton Ellis belies the unbelievable energy stored within the man. He frankly admits that he gets more pleasure out of chemistry than from golf, yet he is a confirmed golfer. "You see," he explained somewhat apologetically, "one must have regular exercises to keep physically fit."

Fireworks For Festivals

[*Continued from page* 47]

month's earnings of a coolie. They also charge that the Chinese "flash" crackers are cheaply made, with quick burning fuses, and are unsafe. Manufacturers state that most accidents are caused by the use of such fireworks. American fireworks, they claim, are more carefully made and possess more-slowly burning fuses. Incidentally, American fire crackers seldom measure more than five inches. This is due mainly to the fact that the government demands that manufacturers make their product safe enough for use by the general public.

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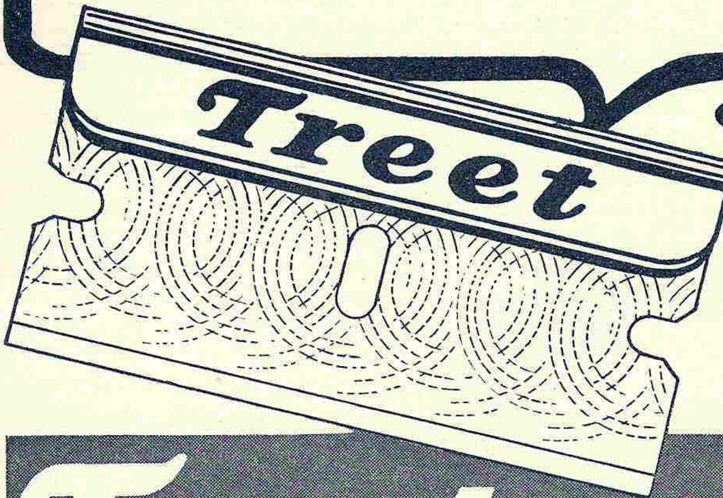

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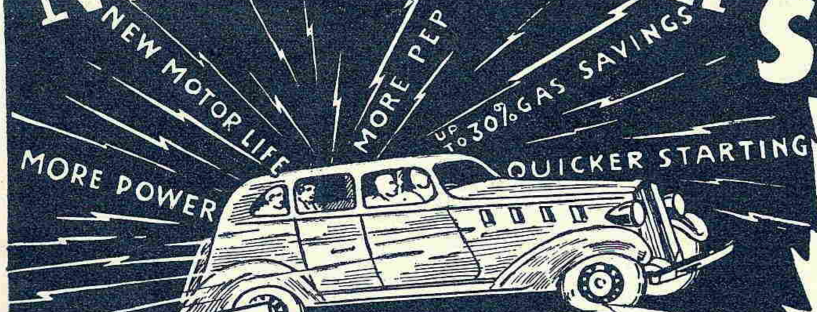

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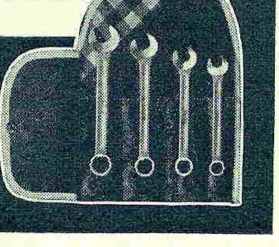

Building A Midget Racer

[*Continued from page* 85]

⅛″ thick and 1⅛″ diameter is enough. Fasten the brake drums to the rear hubs, inserting an aluminum space ring between the drum and the hub. The drums, which are 8″ in diameter, are taken from a Model "T" Ford, 1925 or earlier. Austin brake shoes are used, the "fish-plate" being attached to the spindle body with four 5-16″ cap screws. Timken bearings, like those in front, are installed in the rear hubs.

Make the rear radius rods in the same manner as the front ones. Instead of flattening the ends, cut off pieces of steel rod of the right diameter to fit snugly inside the tubing, turn them down to ½″ diameter for a length of 2⅝″ and thread them at the small end for a distance of ⅝″, then slip the large end into the tubing and weld into position. Now, bend them so they will go through the spring eyes and anchor-bolt eyes on the spindle bodies, holding the latter in place on the ends of the springs. The center of the ball joints should be located midway between the top and bottom of the side rails.

Make the cowl frame ½″x20 gauge square tubing, electric-welding all joints. The front part consists of two pieces, exactly alike, with a 1-16″ thick sheet metal fire wall between them. The bearing for the steering rod is fastened to the cross-member of the rear part. This bearing is a casting made just like the steering gear bracket, except a bit smaller, fitted with a bushing reamed to fit your steering rod. Mount it on the cross-piece with 3-16″ bolts.

The disc wheels are of very novel construction, being made from "T" Ford emergency brake drums, 1926 or '27 model, to which are welded airplane rims, drop-center type, for 20″x4″ tires, braking surfaces having been removed from the drums.

The tires are of the non-skid type, and may be purchased through any Goodrich, Goodyear, or Firestone dealer. These tires were not intended for use on an automobile, or course, but they are admirably suited for a racing car of this type, being built to stand up under the severe punishment they receive on an airplane. At ordinary speeds, their mileage will compare favorably with that of regulation automobile tires.

Bolt the cowl frame to the side rails by means of right-angle fittings made from 18 gauge sheet steel.

The foot rest, made in the same manner as the seat, is bolted on with 3-16″ bolts, and should be located to suit the driver.

You have, of course, noticed that the steering wheel is located slightly to the left of the center-line of the chassis. But this really makes no difference, since you naturally lean to the left in driving, and, even if you didn't, the distance off-center is too slight to be noticed. Most professional one-man racers have the steering wheel a little to one side. However, if you insist upon

[*Continued on page* 127]

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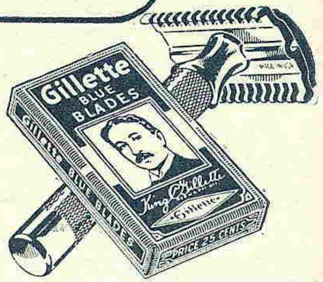

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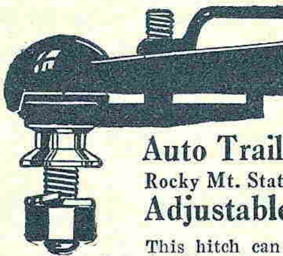

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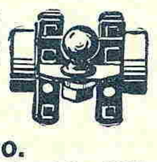

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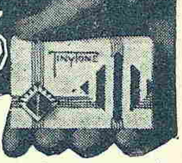

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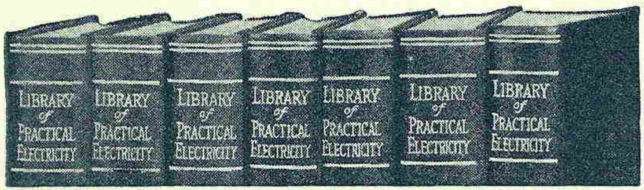
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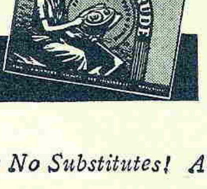

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EVINRUDE

A Midget Superheterodyne

[*Continued from page* 103]

through a "banana" plug and jack combination to facilitate connection and disconnection. This jack is located at the rear of the subpanel, on the extreme right.

From the jack, the impulses feed into the primary of a standard tuned-radio-frequency antenna coil of the proper inductance for broadcast band coverage, or short wave, according to which range is desired. This antenna coil should be equipped with a coupling ring. The lower end of the primary winding is grounded to the chassis and also connects to the rotor plates on both sections of the 2-gang t. r. f. variable tuning condenser of .000365 mfd. capacity.

The local frequency for mixing is generated in a padder system oscillator, using a pentagrid oscillator coil for excitation. The padder condensers have a total capacity of 1200mmfd., combining an .0008-mfd. fixed mica condenser shunted across a 400-mmfd. variable padding condenser. The value of the oscillator resistor is 50,000 ohms and the grid condenser has a capacity of .00025 mfd. The B supply for anode grid No. 2 is fed through a 15,000-ohm voltage reducing resistor, from the positive 135-volt source. Notice that all voltage taps are connected to the 5-prong socket at the back of the sub-panel, allowing the batteries to be plugged in.

At the juncture of the plate winding on the oscillator coil and the 15,000-ohm voltage dropping resistor, a by-pass to ground is provided through a .05-mfd. fixed paper condenser.

Note that the recommended grid bias is applied to the control grid of the tuned signal section of the 1C6 tube from the negative three-volt tap on the C battery, this being dissipated through a .25-megohm resistor. There are some cases in which the set may work better without this grid bias, but that is the exception, rather than the rule. A .05-mfd. fixed paper condenser is used between the lower end of the antenna coil secondary and the ground to provide a signal path without allowing the C battery to become shorted.

The screen grid of the 1C6 tube is supplied with a positive potential off the sliding arm of the regeneration potentiometer that also feeds the screen of the 32 detector.

The I. F. transformer is of the compact midget type and is peaked at 175 kilocycles for broadcast use. Since this coil is not provided with a tickler winding, one must be added to facilitate feedback from the plate of the 32 for regeneration. By loosening the two small bolts at the top, the transformer can readily be slipped out of its shield can. The tickler is wound on the outer end of the core, about an eighth of an inch from the secondary winding as shown on drawing. The tickler should consist of about 10 feet of No. 36 d. s. c. magnet wire, wrapped in the same direction as the secondary of the transformer. This is important! After winding the tickler, dip it several times into melted paraffin, allowing it to cool and harden between dips. This will hold the winding in place.

The gridleak is a 2-megohm resistor; the grid condenser has a capacity of .00025 mfd.

Regeneration is controlled by means of a 50,000-ohm potentiometer. The positive lug of this potentiometer connects to the positive 135 volts B through a 30,000-ohm fixed resistor. The negative end makes contact with the negative B supply at the chassis. The moving arm, on center tap, connects to the screen-grid taps on both the socket for the 1C6 and the 32 tubes. From the center lug, a .5-mfd. fixed paper condenser by-passes to the grounded chassis.

In connecting the tickler winding it is best to experiment by hooking it first one way and then, if the set fails to work satisfactorily, reversing the leads after making sure, however, that the fault does not lie elsewhere.

The 40-millihenry radio-frequency choke is of the mounted type, bolted to the under side of the chassis. From the end of the choke connected to the tickler coil, a .0001-mfd. fixed mica condenser is used to provide a radio-frequency by pass to the ground at the chassis.

The filtered signal flows from the radio choke to the 750-henry audio-frequency choke. The latter choke should be of the type that is especially recommended for use with screen-grid detectors. The lower end of this choke connects to the positive 135 volt B at the battery plug-in socket. A 250,000-ohm resistor is shunted across the audio choke to thwart threshold howl, that annoying squeal that is the ban of regenerative sets, and to provide a voltage path to the plate of the 32. A .01-mfd. fixed paper capacitor is used as a signal by-pass voltage blocking condenser to the control grid of the 33 tube. The grid resistor for the 33 tube has a resistance of 500,000 ohms and the lower end connects to the negative 13.5-volt tap on the battery connector socket. The screen grid carries a positive potential of 135 volts, in accordance with the manufacturer's recommendations.

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Building A Midget Racer

[*Continued from page* 124]

having it in the center, lengthen the pitman-arm shaft and devise another method of mounting the steering gear housing to the frame.

For the clutch and brake levers, use motorcycle gear-shift levers, mounted independently on a short shaft located on the right-hand side rail. The outside lever operates the brakes and should be bent out a little so it will be clear of the clutch lever. Model "T" Ford emergency brake parts are employed for the brake pull-rods; the connecting rod from the lever to the brake cross-rod and the crank levers on the end of the latter. The accelerator pedal is mounted on the cross-rod and should be slipped on before the crank levers are attached. This also applies to the cross-bearings.

Make the instrument board from 14-gauge sheet aluminum and screw it to the cowl frame. Instruments should consist of an oil pressure gauge, a Fahrenheit gauge, a tachometer, and an air pressure gauge. The latter is necessary only when you use a pressure-feed fuel system, which is preferable for racing purposes. The tachometer is connected to the camshaft of the motor by means of a suitable adapter.

For racing, a 4-gallon gasoline tank is mounted in the tail of the car, the air-pump being located on the right-hand side rail within easy reach of the driver. A reserve oil tank of 5 quarts capacity is installed in the cowl, making a total oil capacity of around 2 gallons.

If the builder does not intend to do any racing, he needn't put the gas tank in the tail, unless desired. There is no need for the oil tank in the cowl since the crankcase will hold enough, so put the gas tank there and use the gravity feed system. Sufficient room is available for a 4-gallon tank, which, by the way, can be made by any tin smith.

Before installing the motor give it a complete overhauling. Be sure the magneto is in good condition and well-cleaned. It should not cut out while running at high speed, especially on a turn as this might result in a dangerous skid. Use racing spark plugs; the commercial type will foul at high speeds. See that the oiling system is working at its highest possible efficiency. In general, put the motor in such a condition that it will turn up a maximum number of revolutions. For racing purposes, use an anti-knock fuel instead of straight gasoline.

If an Austin transmission is used, the only change necessary in the transmission itself is to remove the bend in the shift lever and shorten it to 8″ above the cover. A ½″ rod, carried on two bearings of steel tubing which allow it to slide back and forth as well as turn, is mounted just above and along the center-line of the motor and extends horizontally from a point just above the shift lever on the transmission to about 3″ in front of the instrument board. The front bearing

[*Continued on page* 129]

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Auto Engine For Marine Use

[*Continued from page* 107]

nipple is welded into each end at the proper angles to clear the manifolds and carburetor.

The water is pumped from the lake by a regular marine type pump, mounted on the front timing gear cover as low as possible for self priming and driven by a V-belt which also drives the generator. The cold water is taken directly from the pump through the oil cooler at the rear, to the water cooled exhaust manifold which preheats it slightly before it enters the cylinders.

The manifold is nothing more than a discarded Ottwell Heater, which can be picked up at the junk yards, with plates welded over each end and ½-inch water pipe nipples welded into the center of the plates. Connections are made between the nipples with rubber hose. The water leaves the front end of the manifold and enters the cylinder head through a nipple welded to a plate which covers the original water pump opening and out through the regular port on the left side of the block. A hole is drilled through the head at the extreme rear and threaded to take a ¼-inch pipe nipple which is connected into the exhaust pipe below the manifold. The extra outlet takes the hottest water from the cylinders and also keeps the hot exhaust pipe from burning the side out of the boat. This completes the oiling and cooling of the motor.

The reverse gear is next and made up as follows. Get a complete model "T" Ford Transmission and flywheel in good shape at any car wrecking lot. Disassemble and remove all magnets and the ring gear.

Machine the flywheel down to within ½-inch of the triple gear pins and face off the forward side of the wheel that attaches to the crankshaft.

Weld the low speed and brake drums together to form one unit. Machine out a ¼-inch deep recess in the regular model "A" flywheel to fit the reduced model "T" wheel. The dowell pins and bolt holes in both flywheels exactly fit the crankshaft flange. Longer cap screws are used to hold the wheels to the shaft. Three ⅜-cap screws are then installed between the triple gear pins to further hold the wheels together.

Assemble the transmission in the usual way, leaving out the brake drum drive gear. Before installing the driving plate, machine the end behind the clutch spring and around the square universal joint hole to fit the inside diameter of a model "A" rear transmission ball bearing which is pressed into place. A felt washer and spacer installed between the bearing and spring cup will stop any oil leakage.

The standard reverse band, only, is used on the reverse drum. With the brake drum welded together, tightening the band on the reverse gear gives you approximately 90% of your forward speed in reverse. This is sufficient for all braking purposes and gives plenty of power for backing out of docks. This completes the reverse gear assembly but as this unit requires oil a case has to be built around it which must be oil tight.

It is impossible to balance this unit exact, as the revolving drums will throw it out slightly, but you will never experience the slightest trouble with vibration, since with the unit construction there is no misalignment.

The case and controls are next and possibly the hardest part to build up. Install the standard Model "A" flywheel housing after welding up the small hole in the bottom and place a gasket under the starting motor and the small plate which covers the rear main bearing cap. These must be oil tight. Next take an old Model "A" clutch housing. Cut it off, 3½-inches to the rear of the face which bolts the flywheel housing and with this ring bolted to the housing and the transmission assembled, a U-shaped piece of boiler plate ⅛-inch thick is shaped to fit over the assembly. The rear end will have to come over the bearing on the driving plate and a cardboard template cut out and fitted first. Any tinsmith will cut out and shape the boiler plate for very little. An inspection hole of sufficient size through which to reline the band, when necessary, is left on top. A model "A" Universal inner ball cap is used at the outer end. This can be machined out to fit the outer diameter of the ball bearing and a flange welded to the cap to further support the bearing.

After all parts are cut and fitted, weld the entire unit to the clutch housing flange. Have everything ready and do all welding at once. Preheat the entire housing, using cast iron rod and flux and no trouble with cracking will be experienced.

Bolt the case to the motor and align and bore the holes in the case for the band tightening cam and the clutch "throw-out" shaft. These can be cut out of an old model "T" transmission cover and welded into the new case. They will fit with very little altering. The inspection plate is next screwed to the top with a gasket under the plate. The outside adjusting screw for the band cam can be welded in when taken out of the old case.

A little head work is necessary in fitting up the controls and band tightening cam. Remember as you tighten the band, the clutch plates must be released. One-half inch water

[*Continued on page* 134]

Building A Midget Racer

[*Continued from page* 127]

for this rod is mounted on the front end of the motor, and the rear one on the fire wall. A handle about 6" long is attached to the rear end of the rod, extending downward so it can be reached below the instrument board. A rubber grip may be slipped on it if wanted. On the front end of the rod, weld a piece of 3/4" tubing, extending down over the shift lever knob with an overlap of about 1". The transmission will be installed backward in the car.

Gears are shifted in the following manner: Reverse—Twist handle to your right and pull toward you. Low—Twist handle to right and push. Intermediate—twist to left and pull. High—Twist to left and push.

Hook up the clutch lever, using a "T" Ford emergency brake pull-rod, cut to length. This arrangement is clearly shown in the photograph.

Shifting the gears may be a bit awkward at first because you have to operate the clutch by hand, but you'll soon become accustomed to it. However, it would be an easy matter to rig up a foot pedal if desired.

For the throttle control, a vertical rod connects the pedal to an "L"-shaped lever, mounted on the fire wall directly over the pedal and level with the throttle lever on the carburetor. The "L" lever is connected to the carburetor by a flexible tube and piano wire—just as the throttle control on a motorcycle.

Locate the spark control on the instrument board, using an airplane-type "T"-handle dash control, obtainable from most air-craft supply companies.

With construction advanced to this point, the builder now has the entire chassis of his "Arlen Special" completed except for the installation of the 4-cylinder motorcycle engine. In next month's concluding installment we will take up the construction of the racing body and the other details which will give the midget racer the necessary finishing touches that make for a truly beautiful and highly satisfactory dirt track speedster.

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An ingenious way of making young trout clean house, that is to say, sweep out the debris in their pond, has been devised in a new type of trout rearing pond.

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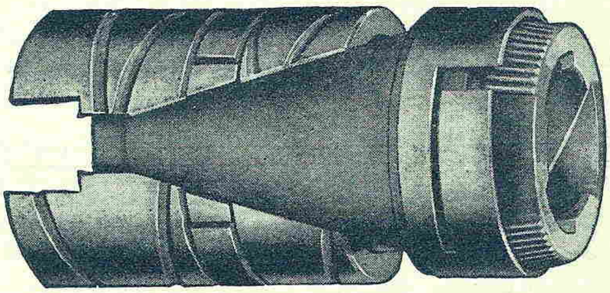

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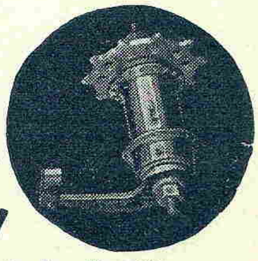

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Tapped Metal Accessories

[*Continued from page* 105]

through the button switch and then carry them both on up through the brass bushing, attach to the socket and then slip the shell over the candle socket.

Finish all of the iron work with one coat of flat black paint. Allow it to dry thoroughly, then with a piece of emery paper wear off enough of the paint so that all of the highlights show up well on the iron.

Dissolve a small piece of liver of sulphur in about a quart of water, wash over the outside of the shade until the copper takes on a dark brown color, wash and let dry thoroughly. Buff or polish the shade and coat with lacquer to preserve the finish.

The shade is attached to the bracket with a round head brass screw which passes up through the apex of the shade, through the bracket and into a brass terminal which may be obtained at any electrical supply store.

Like the lamp, the owl book ends are simple to make and the material required costs little or

[*Continued on page* 153]

Backyard Railroad

[*Continued from page* 32]

Quinby made movies of the doomed railroad. From the film, he made enlargements of rolling stock, bridges, stations and other features, followed by scale drawings. Bit by bit, over a period of years, he has built the miniature replicas of the multiple-unit electric cars, electric locomotive, work car, freight cars, tunnels, bridges, trestles, power house and other features. For several years the road has been in constant operation, summer and winter alike.

As secretary of the Electric Railroaders Association, a nation-wide group of enthusiasts who make a hobby of real and make-believe electric railroads, E. J. Quinby has set the example with his back yard road. In fact, his railroad is the official test track for models built by other members. Many a Saturday, the fond builders of tiny locomotives and cars try out their handicraft on the 250 feet, or one full scale mile, of track. This distance gives the models a chance to display their speed. For utmost realism, the trains and cars are controlled from either the fixed controller—the real thing, actually taken from a dismantled electric car—or from a portable controller set anywhere along the line.

Current for the trains is provided by a miniature concrete power house containing a rotary converter and switchboard with meters, circuit-breakers, indicator lights and switches. The usual 110 volts A.C. is converted into 25 volts D.C. If a short-circuit or excessive drain occurs on the trolley line, the circuit-breaker automatically kicks out, protecting the rotary converter.

Heart Operation Performed

[*Continued from page* 40]

insect on a hollowed-out block of paraffin.

Next he took a fine piece of human hair and tied the wee heart to a finely balanced glass needle. A spot on its very end was darkened so that a bright light thrown across the darkened tip would cast a moving shadow as the needle moves under the heart impulses.

Immediately, the lens of a high-powered microscope catches this shadow, magnifies it many times and throws it into a special camera where it plays over a slowly moving sheet of photographic paper. This makes a permanent record of the "fingerprints" of the insect's heartbeats.

These highly magnified "fingerprints" are able to trace on lines resembling seismograph (earthquake) records, the normal rhythm and contraction of the bug's heart. Ordinarily these lines are even, but they become jagged and irregular as the heart is drugged with nicotine. Finally, while the wee organ slowly wore off the effect of the poison, the photographic records revealed the slow return to normalcy in lines that became more and more even.

The unique tests offered weird results. Occasionally the heart, apparently normal, showed the queer habit of "reversing itself" for no reason known to science. In summing up his experiments Dr. Yeager says: "We plan to try out numerous drugs in order to get at the basic facts of insect heart action. Discovering the fundamental things that make insects tick eventually will help other scientists find out what makes them stop ticking, so that when they become too ruinous to the nation's crops they may be destroyed effectively."

The Subway City Grows

[*Continued from page* 54]

connecting New York and New Jersey, which accommodates about 11,000,000 auto passengers every year, there has been a movement to build fewer bridges in congested areas. The War Department sympathizes with this movement because fewer bridges will simplify harbor protection. The newest tunnel under the Hudson is called the Midtown, 8,000 feet long and 31 feet in diameter on the outside, and 21½ feet wide on the roadway. This same tunnel may later be driven clear across the island of Manhattan and beneath the East River, emerging finally on Long Island.

Underwater tunnel construction is usually more expensive than ordinary subway work. The new Midtown costs about $40,000,000 for a length of one and one-half miles.

The heroes of construction on the vehicular tunnels are the muckers, sand hogs and engineers who work under conditions that make many so-called hazardous jobs appear very tame.

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Photographing Wild Animals

[*Continued from page* 112]

wild life. It is a small box containing two flashlight batteries with a socket mounted on top of the box for taking the photoflash bulb. There are two terminals on the outside of the box with wires leading from these to a baited switch which the animal unknowingly throws, thus setting off the flash.

The box is made of plywood. The sides are 1⅜ inches high. Two of them are 3¾ inches long, and two are 2 11-16 inches long. The bottom and top boards extend about a quarter of an inch from the sides. A regular porcelain socket can be used although the inner part of an old lamp socket will do. The two wires leading from the socket go to two thumb tacks which are pressed into the sliding board and kept in contact with the batteries. The center terminals of the batteries should be facing opposite directions. A spring attached to the back of the sliding board insures a good contact.

Although reflectors can be bought at camera stores, a much cheaper one can be made by attaching the bulb clamp from an old lampshade to half of a tobacco or coffee can. If you do not have an old lampshade from which to take the clamp, a suitable one can be had at any ten cent store.

As for switches to set off the photoflash bulb; there are unlimited possibilities. You can use your ingenuity in making one as any little device will do. In arranging the set up, tie the bait to a string, and fix the switch at the other end of the string so that a tug on the string will work it. Another way is to have the switch buried under loose bark or leaves with the bait protruding above ground. The animal will make the contact when it lifts the bait. The wires from the switch to the box can be covered if desired, but this is not necessary. Above all, avoid using a switch which makes a noise or a sudden movement, as this would startle the animal before the flash has gone off. The simple knife switch arrangement shown in the main illustration is recommended.

Before attempting to take any pictures set out some bait near the animal's hole or den or where they will be sure to find it. Do this for several nights so they will begin to expect it. Then, when they come for it every night, you are ready to take pictures. After dark set your camera on a tripod or other rigid support, focus it on the baited string and set the shutter for time exposure.

The battery box can be placed anywhere so long as the flash does not shine into the lens when it goes off. Fix switch and battery box in position and test, holding flashlight bulb in socket, to see that everything is working all right, then screw photoflash bulb in socket and open shutter. It is advisable to cover the camera with something to protect it in case of dew or rain.

The shutter must be closed again before the

[*Continued on page* 153]

Fire Walking—Fact Or Fable?

[*Continued from page* 60]

estimated that the temperature near the surface of the stones must have been at least 400 degrees F. It was noon time, and the fierce heat of the sun was also beating down upon the intrepid fire-walkers.

Seven or eight natives then approached, and walked in single file round the oven and out at the point of entrance. They were walking through the fire steadily for a period of at least half-a-minute. The pith and roots of a cabbage tree (which the Fijians call masawe and the Maoris call Ti) were then cooked in the oven and subsequently eaten at the feast.

Immediately upon the conclusion of the ceremony, Dr. Hochen and the others present carefully examined the fire-walkers. They found the skin on the soles of their feet soft and flexible, and not leathery and insensitive to the touch. The skin of the legs and feet was found to be quite unprepared and uncoated with any chemical substance, as they verified by touch, smell and taste. For the latter tests the tongue was applied to the soles of the feet. The pulse in every case was found to be normal. The feet had also been examined just before the ceremony began.

Examination of the stones showed that they were basaltic in character, and became white-hot in the oven. The brilliance of the noon-day sun rendered their white-heat invisible, however.

According to Dr. Hochen, there did not appear to be any trance, or other abnormal condition, on the part of the participants—other than intense faith. The natives cannot explain it themselves, except that it is a "power" which they can sometimes transfer to others by holding them by the hand.

Few natives in Fiji can perform the fire walk. No incantations or religious ceremonies are performed, these having fallen into disuse since the introduction of Christianity. Only the members of a certain clan can successfully perform the walk.

Dr. Hochen concludes that no alum or other substance was employed by the natives; that their feet were not leathery or abnormally tough; and that even if hypnosis or an anaesthetic had been employed to produce insensibility to pain, these would not prevent cautery. He concludes that the whole subject requires a "thorough scientific examination."

Prof. S. P. Langley, of the Smithsonian Institution, is another who witnessed the fire walk, this time in Tahiti. His account is much the same. Similar accounts have been rendered by many others, and their testimony is markedly similar.

The latest instance to be carefully investigated —that of Kuda Bux—was under the auspices of Mr. Harry Price, the Director of the Psychical Laboratory of London University. A number of

[*Continued on page* 135]

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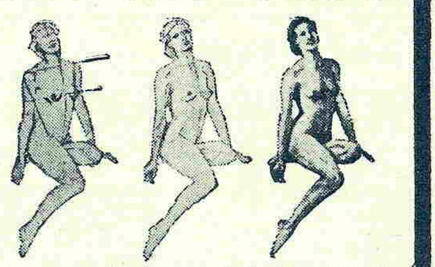

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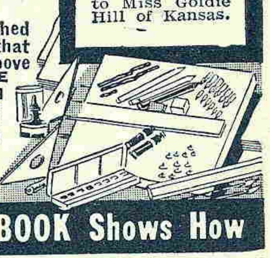

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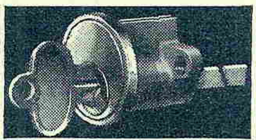

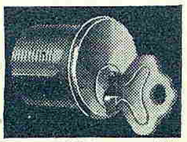

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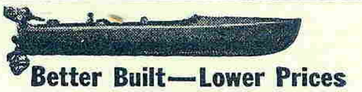

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Home Repair Problems

[*Continued from page* 97]

pasteboards and similar trash. Fires are often caused by spontaneous combustion among rags located in a closet or storage box. It is always a good idea, too, to board up all windows and doors so as to prevent ransacking. Clothing should be packed in mothproof containers and all rugs and carpets rolled up in cedar treated paper or in ordinary paper containing moth flakes.

When possible, clothing should be packed in wooden packing cases and a liberal amount of moth flakes sprinkled in pockets and folds of the materials. If the packing case is then nailed shut there is very little chance for vermin to attack the contents.

Leaking faucets often result in rust stains appearing on bathroom fixtures. Since the removal of the stains is in many instances difficult it is wise to replace washers as soon as they show signs of leaking. Where the seat of the faucet is worn it should either be reseated or else special reseating washers used. Ordinary washers will not stop a leaking faucet when the seat is worn excessively.

Rustic garden furniture can be protected against wood boring insects by varnishing surface so as to check the entrance of the vermin. The varnish, being transparent, will not detract from the beauty of the furniture, but add to its appearance by giving it a semi-gloss finish. Other unfinished wooden furniture or garden decorations can be treated in the same manner.

Loose door hinges should be tightened as soon as noticed. Where screws refuse to take hold, a repair can be made by filling in screw hole with a synthetic wood compound. If a door sticks, the high spots should be planed down until the door opens and closes freely.

Auto Engine For Marine Use

[*Continued from page* 128]

pipes welded through the case form good bearings for the shafts and save cutting the portion out of the old model "T" case.

The use of ¼-inch machine bolts instead of rivets in the control shaft facilitates assembling. The outside control operates the same way as the lever in the model "T" car except that the cam is welded to the operating lever instead of being on a separate cross shaft. A depression in the cam will hold it in neutral position. A hardened screw end and a little grease on the cam prevents wear.

With this work the conversion is completed except for painting. A good coat of paint will help the appearance wonderfully.

Use about 1 quart of oil in the reverse gear of the same grade as used in the motor. A Universal joint can be made up from a front half of a model "T" and rear half of a model "A", bolted together or a model "T" joint complete, depending on the type of drive shaft used. Be sure to keep these joints well greased. Use the regular model "A" carburetor on the motor, inserting a wedge between the manifold and carburetor to keep it level. A model "B" cylinder head can be used which gives slightly more power. Any standard thrust bearing can be used on the back of the motor.

Forest fires not only destroy timber but clear the way for floods to do increased damage.

Fire Walking—Fact Or Fable?

[*Continued from page* 133]

eminent physicists and doctors were present, and numerous photographs were taken at the time.

The feet of Mr. Bux were examined chemically and in other ways immediately before and after the firewalk. The skin was found to be soft and tender, and quite unprepared by chemicals. A piece of sticking plaster was fastened to one of the feet, and, after the walk, this was not even scorched, nor were the feet of the fire walker in any way burned or injured.

The temperature of the interior of the fire showed that it was 2,552 degrees F. (hot enough to melt steel) while it was 800 degrees F. at the surface. These tests established the actual heat.

Several times the young man walked through the fire and across the glowing surface. Then he said that his "faith had left him," and that if he tried it again he would be badly burned.

Immediately after Kuda Bux's demonstration, a young Englishman named Moynagh attempted to duplicate the feat he had just witnessed. Stripping off his shoes and stockings, he started to walk across the fire. He had only taken a couple of steps, however, when he sprang out of the firepit with a cry of pain. Both his feet were found to be so severely blistered that they had to be treated by a nurse before he was taken home.

If the fire was not really hot, why was Monnagh burned? And if it really was *hot, why was not Kuda Bux burned likewise?*

In many of the observed cases, the sâme problem confronts us. Fatal injuries have been recorded of those trying the feat. Yet, on the other hand, after the fire-walker has given the necessary "power" to even the Europeans who attempted it, they walked through the fire unharmed!

In many cases, it is said they even walked through flames without their clothing even smelling of fire. A mystery!

These cases are not unique. Instances are on record of modern "psychics" or mediums who have accomplished the same thing on a small scale. Sir William Crookes and others have reported that a medium by the name of Home went to his fireplace, took out a burning coal, and held it between his fingers, blowing upon it until the flames licked up between them. He said:

"You do not believe the coal is really hot? Touch it!"

The investigator did so, and received a bad burn immediately. Then, however, Home placed his hand on the investigator's shoulder, saying "All right, now you can take it."

And sure enough he did; he was enabled to hold it for some time in his own hands without even being scorched. This seems like a case of the "transference of power," similar to that employed by the natives, in their rites.

How are such marvelous powers to be explained?

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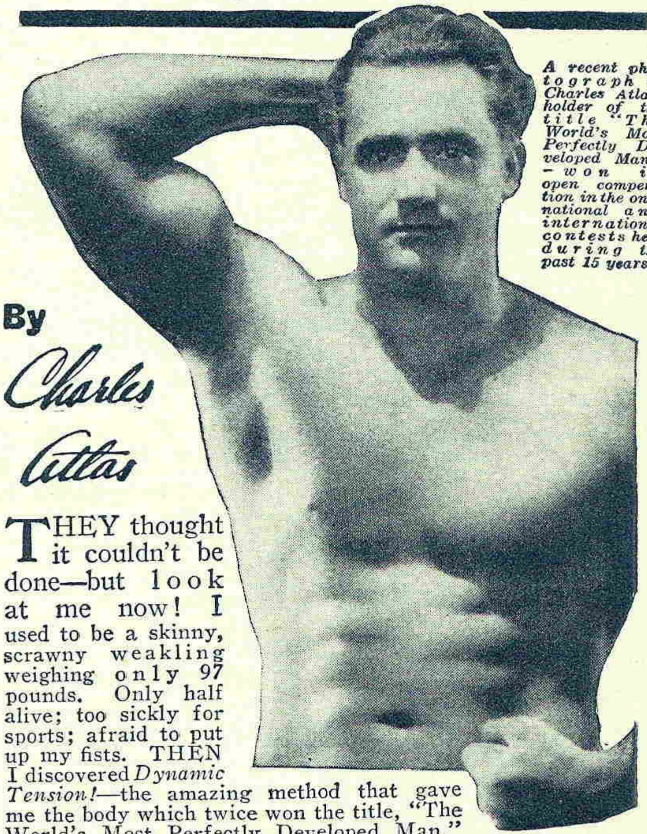

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Lightning With Oudin Coil

[*Continued from page 95*]

dimly seen outlined by a purple discharge. Small flames will dart from the raised hand, hair, and even from the tips of the ears.

Perhaps the most awe-inspiring spectacle is the coil operating under full power in a dark room. Long streamers of purple fire dart out in all directions from the discharge ball, emitting at the same time an almost deafening noise. A grounded wire is now slowly moved towards the discharge ball. The streamers change their direction and snap at the wire. Suddenly a heavy spark bridges the gap, and the air becomes thick with ozone.

Many experiments can be performed with this apparatus, and this short sketch gives an idea of some of them.

Before beginning the actual construction of the device, it is well to know something of the principle involved. Briefly, it is this: as the frequency of an alternating, high voltage current rises, it loses many of its normal characteristics. At extremely high frequencies it is almost a totally different kind of electricity. It produces no sensation of the shock when taken through the body, because as the frequency becomes higher, the path of travel becomes closer to the surface. At extremely high frequencies this path of travel is so close to the surface that it does not touch the nerves. This is known as "skin affect," It has a tendancy to diffuse off the conductor into the air, causing the beautiful brush discharges often seen on insulated wires. This also accounts for the lighting of neon tubes without wire connection. The current refuses to be stopped by nearly all insulators, oil being one of the few insulators having some protective qualities.

In order to produce a current of this nature, four distinct pieces of apparatus are necessary. They are: a low-frequency transformer which converts the low voltage current from the lighting circuit into high voltage current suitable for charging the condenser; a condenser which is composed of alternate sheets of metal and glass; a spark gap which consists of two electrodes separated by air; and a high frequency transformer.

The low frequency transformer should have an output of 3,000 to 5,000 volts. The transformer is of the magnetic leakage type such as used for radio purposes. Since the construction of a transformer of this size embodies considerable difficulties, the reader should, if possible, obtain one already constructed.

A power line transformer may be converted into one of the magnetic leakage type at little trouble or expense. A small transformer, such as is put on poles to step down current from 5,000 volts to 110 or 220, can undoubtably be purchased from an electrical junk-yard or direct from the local power company at a very reasonable cost. The power drawn by the unaltered transformer probably will be too large, but this need cause no worry as it may be reduced by the choke about to be described.

The choke consists of 510 turns of No. 10 D. C. C. copper magnet wire. This coil is wound in four layers on a bakelite tube 16 inches long and two inches in diameter. To wind the coil, lightly force two square blocks into the ends of the tube and mount it in a lathe. In the absence of a lathe one can easily construct a coil winder to be turned by hand or a foot treadle. Shellac the tube and cover it with a layer of waxed paper. Then begin winding the coil ½-inch from the end of the tube to the other end, leaving the same margin. After completing the first winding, cover the layer with six sheets of waxed paper and wind back to the starting end. Solder a tap of wire to the last turn of this layer, cover as before with waxed paper, and wind another layer. This layer also should be tapped and insulated with waxed paper. The last layer is wound to within 1 inch of the end and the wire anchored to the coil with friction tape. The completed coil is now covered with ten sheets of waxed paper and liberally soaked with shellac.

The tube to contain the core should be small enough to slip in and out of the coil easily. It is packed with soft iron wire of No. 20 gauge and the ends trimmed to make a smooth job. About ten pounds will be needed for the core. By using the taps to vary the number of turns and by sliding the core back and forth in the coil, the value of reactance is readily changed. If the reactance is not sufficient to prevent "blowing" of fuses, wind another layer of No. 14 wire on the coil. The reactance coil is connected in series with the primary of the low frequency transformer, as shown in the diagram.

The purpose of the condenser is to store the high voltage current momentarily. When sufficient energy charge is stored it discharges across the spark gap. While this discharge may seem to be only one continuous spark, it is in reality thousands of discharges first in one direction and then in the other. No sooner does the potential fall to a low value than the condenser is recharged, starting the cycle of operations all over again. By this process the frequency is raised to the required point.

The condenser is made from glass plates, sheets of tin foil and copper ribbon for tab connections. The glass plates can be bought from a photographer already cut 8x10 inches and are preferable to window glass because they are free from bubbles and other imperfections. To clean them they should be soaked in hot water and then scoured to remove the emulsion.

To make the condenser, 132 plates will be required. It might be well to have a few extra in case some are broken or prove defective. Sixty of the cleaned plates are now covered in the center on both sides with heavy tin foil cut 6x8 inches. This tin foil may be purchased from wholesale hardware dealers in rolls a foot wide. As is readily seen, 40 feet will be needed. If it cannot be obtained in this form, a florist might be able to supply it in sheets.

To fix the tin foil in place, the plates are heated in an oven, rubbed with a cake of beeswax, and the tin-foil sheet pressed on the center so as to leave a margin of one inch on each edge. Both sides of the plates are covered in this manner. Any ridges or wrinkles in the foil should be pressed out by rubbing gently from the center with a wad of cloth. Copper strips 3/8 of an inch wide and three inches long are soldered to the upper left hand corner of each sheet of tin-foil after which the condenser is ready for assembling.

First a plate without tin foil is taken, then a plate prepared with the foil is placed on top of it, then another clean one is placed on top of the prepared plate. These plates are stacked together until five of the prepared plates have been used. A clean plate is then placed on top of the pile to act as a cover. The unit is then bound with friction tape to prevent the plates from separating during the insulating process. When all the plates have been used there will be 12 units ready for insulating.

The first method of insulating is perhaps the best if it be not desirable to move the condenser very much. It consists of submerging the entire condenser in a tank of transformer oil. If this is done be sure that the wires from the individual units are above the surface of the liquid. The other method of insulating consists of dipping the edges of each unit to a depth of two inches in a hot mixture consisting of equal weights of beeswax and rosin.

We now come to the construction of the spark gap. This consists essentially of a fan motor turning a copper or steel disc, slotted as shown on page 94. The discharge electrodes are placed on either side of this disc so that when it revolves new faces are constantly being presented to the spark. This not only keeps the metal from oxidizing but constantly circulates a current of fresh cool air between the electrodes.

The motor for this gap may be of any convenient size. An old fan motor is best as it uses little current and has a fairly high operating speed. The rotating disc should be at least 3/8-inch thick and 10 inches square. After finding the center of the piece of metal, a circle of 10 inch diameter is drawn, then one of 9 inches and finally one of 3-inch diameter. The metal plate is next mounted on a wooden faceplate in the lathe and a cut taken through the metal on the 3-inch circle and a similar cut taken on the 10-inch circle. The disc should now be divided with 24 radial lines running from the center and crossing the edge at 24 equidistant points. Since the radius of a circle is equal to 1/6 the circumference, the 9-inch circle can easily be divided into six parts with a compass, each of these parts cut in half and then each part once more halved making 24 equal parts. Alternate segments between the 9-inch circle and the edge are removed. This is best done by cutting the two edges down as far as the circle and then breaking off the fragment. This is entirely permissabe since the bottom of the cut does not have to be smooth.

To insulate the motor from the high tension current, the disc is mounted on an insulating hub, which in turn is fastened to the motor shaft. The disc is placed on the fibre and six holes drilled around the edge of the fibre and on through the metal. The two are then bolted or riveted together.

The motor with the completed rotating disc mounted on the shaft should be bolted to a suitable base. Opposite the edges of the disc screw a piece of fibre 1/4-inch thick, 1-inch wide and high enough to extend an inch above the motor shaft. These form the supports for the stationary electrodes. The electrodes are made of brass and ground or filed slightly concave to fit the curve of the disc. The side opposite the concave face of each electrode is drilled and threaded upon a 5/16-inch brass rod which in turn passes through 3/8-inch holes drilled in the fibre supports in such a position that the electrodes are nearly level with the motor shaft. Strips of heavy copper ribbon are soldered to the brass rods and establish connection with binding posts placed a few inches beneath the rods on the fibre supports.

We now come to the final piece of apparatus and perhaps the most difficult to construct, the high frequency transformer. This transformer consists essentially of a large cylinder upon which wire is wound in a single layer for

[*Continued on page* 150]

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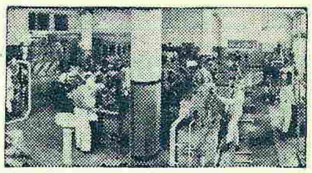
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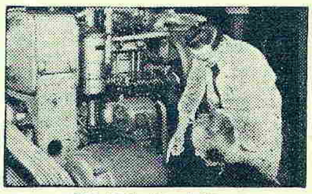
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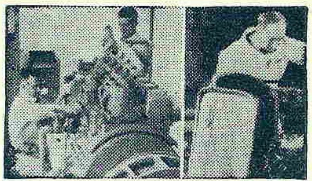
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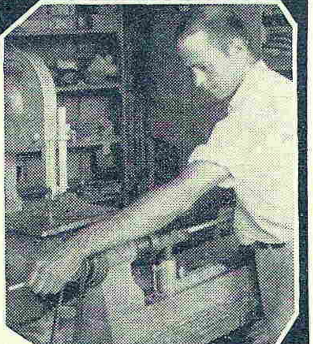

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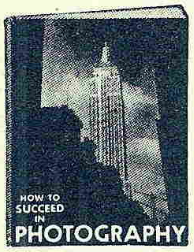

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Taking "Instant" Photos

[*Continued from page* 111]

the speed of professional direct-positive outfits used on the midways of carnivals and fairs.

Any light-tight box that is large enough to hold the developer and fixing-bath trays, with room for manipulation of the paper with one hand, will be satisfactory as a darkroom. For fast work and utmost convenience, a box of up to 10x10x15 inches in size is ideal, for it permits the use of small shelves in the upper part for storing your stock of bromide paper. Such a darkroom may be placed on the ground or on another box underneath the tripod if you wish. If portability is a consideration, you may use a large cigar box approximately 9 in. long, 5½ in. wide and 5 in. high. This is large enough for two 4x5-inch porcelain or hard-rubber trays.

Glue narrow strips of black velvet around the mouth of the box so that light cannot enter, using two hasps to hold the lid down while developing. A slot is cut in one end of the darkroom to permit of introducing the film holders part way inside for removal of the exposed bromide paper, and likewise for reloading. After lining the slot with a rather wide strip of black velvet, test it to see that no light can enter. All testing is done in a dark room or closet by placing a light inside the box.

As has been mentioned, one hand is introduced inside the box so as to manipulate the paper during developing and fixing. Cut a hole in the front, just large enough to admit the hand, then glue in place a light-tight sleeve in which is sewed a piece of elastic to hold it snugly around the wrist. Any heavy black cloth through which light cannot pass is satisfactory. A convenient alternative is to secure a pair of heavy sleeve protectors, of the type used by store clerks, and telescope one within the other. These are already provided with elastic at each end.

While it is easy to get good results with this simple process right at the start, the beginner is advised to avoid harsh and contrasty light on the subject, as the bromide paper does not have as much latitude as regular negative materials. Any portion of the negative may be enlarged by bringing the camera nearer; provision for this is made for this on the negative holder and the negative may be slid forward, brass pins marking the position for regular work. Wash and save all negatives in anticipation of orders for more positive prints; in fact, it is a good plan to stamp your name and address on the back of the paper beforehand.

Many of the herbs for seasoning can be grown in kitchen window boxes in the winter.

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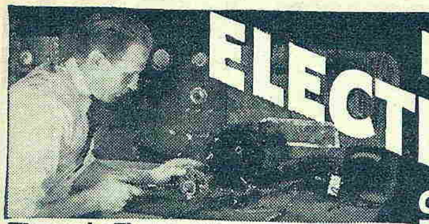

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Black Gold From Alaska

[*Continued from page* 70]

smaller lakes in the vicinity. I took samples back to Barrow and began asking questions."

The existence of the oil lakes was no secret to the Point Barrow colony. "King Charles" Brower, who has reigned over a trading post there for fifty-five years, knew about them.

"But the stuff's no good for anything," he told the soldier. "It's seepage oil, and it won't burn. Too heavy."

Sergeant Morgan was without equipment to experiment, but he had a theory that he meant to try some day. He kept it in the back of his head.

His quick-thinking and courage at the time of the Will Rogers and Wiley Post plane crash brought him more attention, a promotion, and a furlough. Leaving the Arctic Coast with his wife and two children for the first time in many years, Sergeant Morgan did not forget to take samples of the strange black stuff from the lakes of oil.

On a 12,000-mile motor trip over the United States, he kept thinking about his samples, but it was not until he returned to Seattle for temporary duty with the Eighth Signal Service Company that he really went to work.

Here, he had a fine laboratory, serving Uncle Sam's Alaskan communication system, at his disposal. His first step with the Arctic oil was to try distilling it. Initial results were not too encouraging, but he kept busy for many weeks, interrupting his experiments only a couple of hours one day to receive the Soldier's Medal, highest peacetime military award, for his valor in the 1935 flu epidemic.

Finally, replacing distillation with a simple boiling process, he found that the oil separated at a comparatively low temperature, about 250 degrees Fahrenheit. The oil was drained off and, when analyzed, proved to be about equal to ordinary commercial crude. And—a surprise to Morgan!—the 50 per cent residue looked good enough for briquettes.

Before crying Eureka, he had the whole process checked by experts, who pronounced it entirely practical—so practical that the Bureau of Education of the Department of the Interior plans to install a plant at Barrow to be operated by the Eskimos themselves.

"This means," Sergeant Morgan says, "that the main obstacles to development of the Arctic Coast are removed. The oil will be used in simple gravity feed burners by whites and Eskimos at Barrow. The briquettes, which compare with the best commercial grades in the States, will be sent to more remote points. Besides giving warmth and light, the new plant will make it possible to thaw the ground and mine the mountains.

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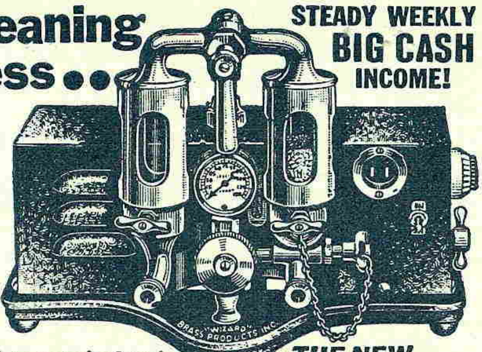

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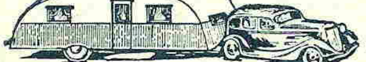

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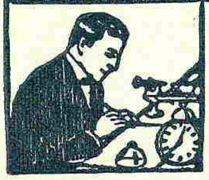

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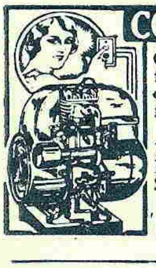

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According to the Government Health Bulletin No. E-28, at least 50% of the adult population of the United States are being attacked by the disease known as Athlete's Foot.

Usually the disease starts between the toes. Little watery blisters form and the skin cracks and peels. After a while the itching becomes intense and you feel as though you would like to scratch off all the skin.

Beware of It Spreading

Often the disease travels all over the bottom of the feet. The soles of your feet become red and swollen. The skin also cracks and peels, and the itching becomes worse and worse.

Get rid of this disease as quickly as possible, because it is very contagious and it may go to your hands or even to the under arm or crotch of the legs.

Most people who have Athlete's Foot have tried all kinds of remedies to cure it without success. Ordinary germicides, antiseptics, salve or ointments seldom do any good.

Here's How to Treat It

The germ that causes the disease is known as Tinea Trichophyton. It buries itself deep in the tissues of the skin and is very hard to kill. A test made shows it takes 20 minutes of boiling to kill the germ, so you can see why the ordinary remedies are unsuccessful.

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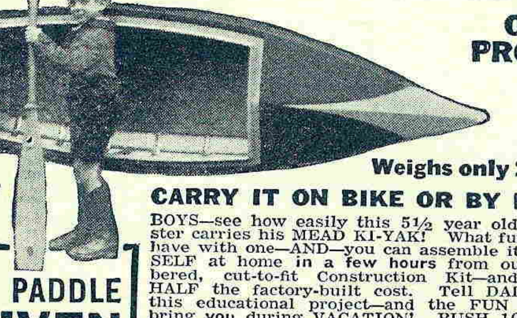

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—if you hurry!

He Beat Oyster At Its Game

[*Continued from page* 73]

gelatinous film coating which had raised the ire of hot-tempered ladies. In its place he substituted a durable, clear lacquer.

Step by step Carl Pfeiffer worked out a suitable technique as a laboratory demonstration. And then he evolved the mass production methods. In his plant at Peekskill, N. Y., he soon had 700 girls engaged in making beads, coating them for pearls, and stringing imitation pearls into necklaces which defy detection except at the hands of experts working at close range with powerful magnifying lenses. This mechanical oyster plant has turned out hundreds of thousands of necklaces, millions upon millions of imitation pearls. Once considered the adornment of first ladies of the land, the pearl necklace has become the proud possession of even the most humble.

The imitation pearl gets its sheen from the several coats of fish silver or essence d'orient composed of tiny particles of the very tips of sardines or herrings. These fish scale particles may be compared with the powder on the wing of a butterfly, which provides such wonderful iridescent hues. Carl Pfeiffer found the most suitable fish scales to be those of a small herring caught off Newfoundland. Forthwith his organization went into the fishery business to insure the source of supply.

One of the many obstacles to be overcome was the mixing of essence d'orient, a water solution, with the clear lacquer. The French had been using gelatine, but Carl would take no chances with ladies' tempers. He worked for months developing a means of mixing those seemingly unmixable things, and finally succeeded in obtaining his indestructible coating.

The original technique of coating was simply a dipping proposition. Beads were mounted on toothpicks or metal rods stuck in cakes of soap or placed in holes bored in wooden disks. Inverted, the beads were dipped in a basin of pearl lacquer. Girls held the soap cakes or disks in outstretched arms and twirled them about to even out the coatings and hasten drying. The scene might have been a ballet school. Hard-headed Carl soon substituted a mechanical means for that twirling act. Today the beads are still dipped in a lacquer bath, 100 at a time, but the disks are placed on a conveyor which twirls them about and carries them for a 20-minute ride about a warm room, delivering them back to the dipper ready for the next dip. The more select beads are sprayed with an air brush, one at a time. The finest beads are given as many as fourteen coats. The lacquer may be colored or otherwise varied for any desired hue.

So much for the coating. But what lies under it? The cowboy did away with the alabaster ball shaped on a lathe and drilled for the hole. He substituted glass. But how did he get the hole in that glass ball, for stringing or mounting?

[*Continued on page* 150]

INVISIBLE INK. CAN BE READ ONLY BY THOSE WHO KNOW THE SECRET. USED BY SPIES, ETC. COMPLETE DIRECTIONS. 10c BOTTLE.

FIELD GLASSES

WOW! What a bargain! Real genuine Field Glasses with **six power magnification.** Center piece quick, one finger focussing. Permits full, unhampered, **two eyed vision** that gives remarkable scope and clarity. Swell for nature study, hiking, sports, and a million other things. Complete with cord, packed in box. **ONLY 39c**

Pocket Telescope

Eagle-Eye Vision
Six Power
25c

Big, 3 draw, 6 power telescope for only **25c!** Swell for outdoors, nature study, sports, looking at the moon. Converted into **Solar telescope** by using smoked glass so you can see sun spots, etc. 5" long. **Price 25 cents**

BROADCAST *thru your radio* TALK - SING - PLAY

BROADCAST your voice on programs coming through your own radio set—make announcements from any part of the house—inject wise cracks, **Josh and mystify friends.** Imitate radio stars, practice crooning, singing, radio acting, etc. Do a "Ben Bernie" or a "Rudy Valee."

World Mike

Made especially for home use, attached in a jiffy without tools. **Not a toy.** Put on your own programs at home, parties, club affairs, etc. Barrels of fun!. Easy to operate.

Price Postpaid 25c

DELUXE MIKE

Large, substantial, all-metal mike. Practise radio singing, broadcasting, programs, etc., thru your own radio. Reproduces voice in loud, clear tone without distortion. Regular table model—can be held in hand. Guaranteed. Connected without tools.. **Price 75c**

Open Any Lock

Did you ever lose or forget your keys? Probably many times. Don't worry any more about lost keys (or any keys, for that matter), as these master keys will open most ordinary door locks. Five different keys for various types of locks. Will save their cost if you only use them once, but you'll probably find them so handy that you'll always carry them

5 MASTER KEYS Price 25c

ALL WAVE WORLD WIDE RADIOS

Remarkable results—simple operation—low prices! **15 to 600 meters. Gets police calls, foreign stations anywhere, code, short wave, foreign and domestic broadcasts, etc.** with remarkable volume and efficiency. Each set complete without tube, phone, battery or aerial. **ONE TUBE BATTERY SET.** Good headphone volume. **Complete Kit $1.55** **Wired ready to operate $2.30. SUPER ONE TUBE BATTERY SET.** Gives better volume & reception. **Complete Kit $2.00** **Wired,** ready to operate **$2.75. ELECTRIC TWO TUBE.** Operates on house current. Uses no batteries. Powerful, sensitive, selective. **Kit, $3.00. Wired,** ready to operate. **$3.75.**

CHAMELEON 25c

A LIVE PET

WATCH IT CHANGE COLOR!

Get one of these most wonderful of all creatures. Watch it change color. Study its habits. Wear one on the lapel of your coat as a curiosity. Shoots out its tongue to catch flies and insects for food. No trouble to keep. Can go for months without food. About 4 in. long. Shipped to any address in USA by mail. We guarantee safe arrival and live delivery. **Only 25c**

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This is a radio in itself as it is possible to get reception with it alone within 25 miles of a station (or up to 100 miles under good conditions). All you need is an aerial & ear phone. Completely assembled & wired with supersensitive crystal, stand, base, crystal cup, arm with cat's whisker, etc. Reception guaranteed. **25c**

Quartermaster • Navy • CCC • Marine • Army Ring

Big jumbo size, with a flashy emblem, surrounded by the American Eagle. Like the U.S. Government men wear! State type and size. **Silver Finish, 25c** **Sterling Silver, $1.00. 14 kt. Gold Ring, $1.75.**

MIDGET POCKET RADIO $1.00

Listen to Music Programs and Sports Everywhere You Go! Loud Tone

Beautiful clear tone while you walk! The amazing midget pocket radio gives you all the entertainment of a radio wherever you are—in the country, office, on a boat, in a car, hotel, in bed, on bicycles, **ANYWHERE and EVERYWHERE.** Size of a cigarette package, yet it operates perfectly. **Beautiful clear tone.** Range, 50 miles. No static or noise. **No batteries, no tubes, no crystals to adjust,** just one moving dial to locate stations. New sensitive rectifier and high efficiency design. Not a toy. **Price Postpaid $1.00. Earphone, 89c. Phone & Radio Set $1.79.**

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YACHT CAPS

Smart, snappy. Just what every real boy is wearing. Cool and comfortable. **White Twill Yacht Cap,** with black oilcloth peak, sweat band, gold braid and brass buttons with anchor. **Price 25c**
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Pistol Cigarette Case 25c

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It looks like a deadly weapon, but it is merely a novel Cigarette Case. Better than the real thing in many an awkward encounter. Great fun "sticking up" your friends. They squirm and protest. Pull the trigger and the slide flies open, disclosing cigarettes. **Price 25c**

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THROW YOUR VOICE!

into a trunk, under the bed or anywhere. Lots of fun fooling teacher, policeman or friends.

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Although this outfit is so marvelously cheap, it is quite efficient, and will take splendid pictures. Takes pictures 2 x 1¼ inches, sharp and distinct. Good lens, view finder a simple yet effective shutter, time and instantaneous. Complete with 4 films, 1 package of printing paper, printing frame with glass top, and a supply of chemicals for developing, fixing and turning out the finished picture, full printed instructions so plainly written that a child cannot fail to understand. **Camera and complete outfit for only 35c** with 10c extra for postage and packing. Extra film 10c per package of five films. Extra printing paper 10c per package.

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25c

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Strongly constructed with a flashy nickel finish. Has dip barrel that allows the cartridges to be loaded in a second. **Medium size, Large size $1.00. Blank Cartridges 50c per 100. Holster (Cowboy Type), 50c. SHIPPED BY EXPRESS, NOT PREPAID.**

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Get Plenty of Chocolates—They'll Go Fast!

Well made of sheet metal with a regular locked door so you can open and remove the money and fill it with chocolate bars. On the front is a **slot to drop the coin in, a window showing the chocolate bars, and a regular drawer that opens when each coin is deposited.** Handsomely lithographed in brilliant yellow, green and red. Get two or three banks and PLENTY of refills—they'll go fast. **SWEET THRIFT BANK & SLOT MACHINE. Only 25c**
Chocolate Bars to fit in the Machine. Package of 10....10c

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PRACTICAL changes for automobile generators. See our advertisement at bottom of page 19. Autopower.

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BE A DETECTIVE. Make secret investigations. Excellent opportunity. Write for free particulars. Raymond Stults, Elkhart, Ind.

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INCREASE Business Now. "Excellograph" Rotary Stencil Printer reprints thousands everything you typewrite, handwrite, draw or trace. Colors. $19.75 to $44.00. Terms. Illustrated Literature Free to Business or Professional Men. Pittsburgh Typewriter Supply, Department K-4, Pittsburgh, Pa.

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AMBITIOUS young men trained, for Air Conditioning and Refrigeration jobs, in our Service Department Shops. Practical Experience under our engineers. Write Training Division M, Western Trades Association, 2024 W. 6th, Los Angeles, Calif.

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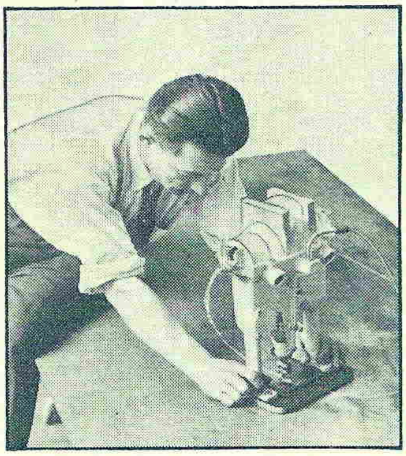
YOUR PENDING PATENTS and new unpatented ideas listed free as news items for manufacturers in our semi-monthly magazine. Send descriptions. "Successful Inventions", Dept. S5, Barrister Bldg., Washington, D. C.

Electric Scroll Saw Designed for Cutting Metal Plate



Metal plate can be cut into any shape with this recently invented cutting and filing machine. The machine cuts metal in the same manner as a jig-saw cuts wood. The saw is fitted with a short vertical movement blade that is started by placing it in a hole previously drilled in the work, after which it is guided over the metal by the operator.

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"HOW To Sell an Invention." Booklet of practical information, compiled by Registered Patent Attorney. Postpaid, $1. C. L. Drew, 582 Market St., San Francisco, California.

INVENTORS: Protect your invention before spending money for patent. Full information free. Federal Inventor's Protective Bureau, Box 1794-F, Milwaukee, Wis.

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SMALL inventions wanted by manufacturers. I'll help you sell your invention. S. Hull, L-7829 Euclid Avenue, Cleveland, Ohio.

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INVENTIONS Commercialized. Patented or unpatented. Write Adam Fisher Company, 582 Enright, St. Louis, Mo.

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STANDARD Electric Lamp kills insects indoors, outdoors. $2.00 up. Literature free. Sauer Brothers, Oakland, Calif.

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DETECTIVES. Work home or travel. Experience unnecessary. Write, American Detective Institute, 2640-T Broadway, N. Y.

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BLOTTING Attachment for Fountain Pens. Just patented. Write for patent copy. Atwood R. Knorr, Berwick, Pa.

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BUILD a Midget Miller Racer. Complete plans for constructing this authentic midget automobile appear in the new 1936 edition of How-To-Build-It along with many other interesting home and workshop plans. Send 50c for this 148-page book to Modern Mechanix Publ. Co., Greenwich, Conn.

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YOUR Ideas developed into practical working model. 30 years successful experience; thousands satisfied customers. Confidential service guaranteed. Bank references. Send 3c postage for 32 page book "Making Inventions Pay." Crescent Tool Company, Dept. T. Cincinnati, Ohio.

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HOME Movies cheaper than Snapshots. Guaranteed 8mm Camera $9.95 prepaid, Film—60c 30-ft. Reminder Sales Co., Cudahy, Wisc.

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RECONDITIONED Motorcycles. New—used parts for all makes. Authorized Harley-Davidson Dealer. Whitman Motorcycle & Supply Co., 405-9 Southwest Blvd., Kansas City, Mo.

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INVENTORS—Small ideas may have large commercial possibilities. Write us for FREE book, "Patent Guide for the Inventor" and "Record of Invention" form. Delays are dangerous in patent matters. Free information on how to proceed. Clarence A. O'Brien and Hyman Berman, 28-F Adams Building, Washington, D. C.

"INVENTOR'S Guidebook" containing 96 mechanical movements and advice about patenting, selling inventions, also "Record of Invention", Free. Frank A. Ledermann, Patent Attorney-Engineer, 154 Nassau Street, New York.

PATENTS

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PATENTS WANTED

INVENTIONS Commercialized. Patented or unpatented. Write Adam Fisher Company, 582 Enright, St. Louis, Mo.

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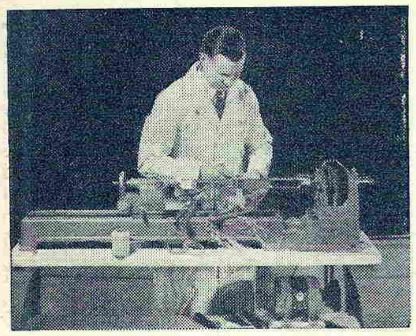

John Borchester of the du Pont Company is shown at his lathe on which "Pontalite," a new crystal clear plastic, is being machined. Resembling quartz, it transmits light around a bend.

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250 ENVELOPES, 85 cents post paid. K. Moore, 6538 Coleman, Dearborn, Michigan.

1500 NEAT Business Cards $1.00. World, 2710-G Clara, St. Louis, Mo.

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AIRPLANE Fan Propellers. 20", 22", 24" $2.00 each. Fanco, 7716 So. Broadway, St. Louis, Mo.

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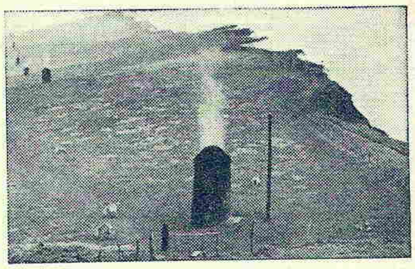
GOLD Reflecting Window Sign Letters. Penny Each. Large Sizes. Easily Applied. New Styles. Absolutely Beautiful. Free Samples. Atlas Sign Works, 7941-G Halsted, Chicago, Ill.

Smokestacks Pierce Cliffs



Presenting a weird appearance, these smokestacks run along the top of cliffs near Folkestone, England. They connect to tunnels through which trains pass through the cliffs.

SELL Celluloid and Cardboard Pricing Tickets, Steel Shelf Moulding, Changeable Signs, Menu Covers. Every Store Prospect. T. Pricing Press, 124 White St., New York.

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FREE Literature. Telescope Makers Supply Co., Box 213, Flushing, N. Y.

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WIND Driven Generators, Propellers, lowest prices. Literature 3c. Woodcraft Propellers, Hillside Station, Wichita, Kansas

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"MODERN Wood Sculpture," complete instruction book on carving statues $1.00. Lee, Wood Art Studio, Dept. 3, Centerville, Ia.

Exposing Counterfeiters

[*Continued from page* 120]

is to note carefully the exact structure of the corner ornaments. There are numerous slight distinctions between the real and the false which the eye can be trained to detect very quickly.

At first thought the repairing of stamps might not be regarded as a crooked procedure. Nevertheless it is being done on a large scale, and with a deliberate intent to deceive, particularly in Europe, Mr. L. Stewart Barr says. In France such sharpers are especially clever and in Austria there are at least 20 specialists who do nothing but "fix up" stamps. Mr. Barr explains:

"As is well known, certain rare stamps in perfect condition will command enormous prices. But if they happen to have a slight tear or thin spot their worth will skid down to perhaps one-tenth of the catalogue value. No wonder, then, that the best of the repair crooks do a flourishing business. They maintain a regular working arrangement with shyster dealers.

"In every sense of the term the repair charlatans are real artists. They know the composition of paper to a precise degree. In the case of a job where a hole or thin spot is to be disguised they are able to add a tiny bit of paper in such fashion that the unaided eye finds it next to impossible to detect the fraud. A true stamp connoisseur, however, can locate the deception immediately by simply dipping the suspected stamp in benzine, whereupon in most cases the added portion will stand out in sharp delineation from the main body of the stamp.

"Similar results may be achieved by carefully examining the stamp under a fine quartz lens. In such case the observer should experience no trouble in distinguishing the tiny outline of the foreign paper added during the repair process."

Despite all the philatelic fakes now on the American collector's market, Messrs. Robinette and Barr conclude: "To combat successfully most of the illicit maneuvers of the stamp racketeers, the average collector needs a sincere love of collecting, an alert eye and a willingness to work hard at his chosen hobby."

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(See regular classified section for rates and other information.)

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SUPER-WONDER Packet offered, containing 60 different stamps from Afghanistan, Transjordania, North Borneo, Manchukuo, Sudan, Macao, Iraq, Charkhari, French and British Colonies, including natives, beasts, ships, etc., all for 5c to approval applicants. Big illustrated lists included. Kent Stamp Company, Box 87-Z (G. P. O.), Brooklyn, N. Y.

GIANT Netherlands Commemorative Triangle, Jubilee, Airmails, Pictorials in Mammouth Collection—10c, with Double Premium Approvals. Free Airmail Collection given regular customers. Tru-Value Stamp Service, Box M1412, Hartford, Connecticut.

MAGNIFICENT Mourning Stamp; complete issue commemorating bloodiest period in history with 20 additional commemoratives only 10c. Friendly Filatelists, 3615 N. Sydenham, Philadelphia, Penna.

EXTRAORDINARY Free Offer—Turks Caicos, $5 U. S., Caymans, Western Samoa (native girl) genuine Baden. Everything free to approval applicants enclosing 3c postage. Viking Stamp Company, 1-MM Hanson Place, Brooklyn, N. Y.

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STAMPS! 100 diff. 3c; 500 diff. 35c; 1,000 diff. 90c! Illustrated Album (4000 spaces) 22c. Approvals sent. Tatham Stamp Co. (D9) Springfield, Mass.

ABSOLUTELY Free! Valuable packet to approval applicants. Don't send postage. Cousens Stamp Co., P.O. Box 2626SS, Youngstown, O.

MONTHLY Stamp Magazine, 6 months and 25 foreign stamps, 25c. American Stamp Journal, Cedar Rapids, Iowa.

FREE!!! New King George VI set. Postage 3c. ROBERTS, 901T Fourth, Baycity, Michigan.

PENNY Stamp approvals sent on request. Weismann, 202 Brook Ave., New York.

5000 DIFFERENT stamps, mounted, $16.50. Meade Bros., Kansas City, Mo.

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$5.00 TO $500.00 EACH paid for Old Coins. Keep all old money. Get posted. Send 10 cents for Illustrated Coin Value Book, 4x6. Guaranteed Buying and Selling Prices. Coin Exchange, Box 17, Le Roy, N. Y.

CALIFORNIA GOLD, quarter size, 27c; $½ size, 53c. Illustrated Catalogue Coins and Stamps 25c. Norman Shultz, Salt Lake, Utah.

FREE: Foreign Coin, Banknote and Large Illustrated coin catalogue, for 4c postage. Approvals sent. Tatham Coinco, Springfield-9, Mass.

COINS, Beadwork, Indian Relics, Minerals, Books, Curios, Stamps. Catalogue, 5c. Indian Museum, Northbranch, Kansas.

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INDIAN CURIOS. 100 good ancient Arrowheads $3.00. Tomahawk Head 50c. Illustrated catalog 5c. H. Daniel, Dardanelle, Arkansas.

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12 ARROWHEAD, Spearhead, Wampum, Gempoint 99c—120,000 Bargains, Photolist 10c. Museum, Rutland, Illinois.

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BLUNDERBUSSES, Matchlocks, Flintlocks, Duelling Pistols. 87 Bargains. Photolist 10c. Museum, Rutland, Illinois.

INVENTORS
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Pages 6 and 7

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He Beat Oyster At Its Game

[*Continued from page* 142]

The solution of the problem was worked out long before Pfeiffer's time, but it remained for him to mechanize the bead-making art. The glass bead is simply built around the hole. A metal wire is used as a core or support for the bead maker to turn a bit of soft molten glass into a perfect globe simply by the whirling action. When the glass has cooled and set, the whole business is thrown into hot nitric acid and the wire dissolved out. Since glass is impervious to acid, the wire disappears and the hole remains. And so you have the secret of those clean-cut holes in all glass beads.

Lightning With Oudin Coil

[*Continued from page* 137]

the secondary coil with a flat spiral of copper or brass ribbon about the base to act as the primary. Because it deals with high frequency electricity, no metal core is necessary. The cylinder for the secondary is 53 inches high and 15 inches in diameter. It is constructed without the use of nails throughout for nails will cause considerable loss in current due to brush leakage. The cylinder is formed on three plywood discs 14½ inches in diameter from mounting board or strips of wood ½-inch wide, ¼-inch thick and 53 inches long. The strips are placed side by side and as close together as possible. When the entire circumference has been covered you should have a solid, well constructed, wooden cylinder. It should now be shellacked and covered with a layer of wrapping paper. This serves to remove the rough edges left by the strips.

The winding on the secondary consists of 700 turns of No. 22 D. C. C. copper magnet wire, with the turns spaced 14 to the inch. This will amount to about 2,670 feet or 5.2 pounds of wire. To wind the coil pass a metal rod through the cylinder and mount it between two saw-horses. Before winding the wire on the cylinder, glue a band of one inch copper ribbon around the cylinder, one inch from the top and another placed three inches from the bottom. The bands should not meet, a space of about one inch being left between ends. Solder one end of the wire to the top band and start winding. The spacing between turns may be obtained by winding heavy cord alongside of the wire. Shellac liberally applied will hold the turns in place.

The discharge ball is of metal and about 5 inches in diameter, mounted on top of the coil. A toilet tank float will serve the purpose very well. Complete the secondary coil by connecting a wire between the metal ball and the top of the coil.

The primary coil is wound with copper or brass ribbon 1½ inches wide in the form of a flat spiral. About 53 feet of the ribbon for the 21-inch outer diameter of the 10-turn spiral winding will be required. The primary supports consist of 8 pieces of fibre 8½ inches long, 2 inches wide and 1 inch thick. The four top pieces have a section cut away as in the drawing so as to keep the coil from spreading. Holes are drilled in these pieces, ⅜ of an inch from the ends, large enough to permit the passage of six inch bolts.

The primary coil is mounted on a wooden base 37 inches in diameter with the four fibre pieces to support the primary located so that the primary will be in the center of the board. The supports are then bolted to the base, thus holding the primary securely in place.

Mount the secondary inside the primary coil on a wooden base 16 inches square, supported on four wooden blocks. Place the blocks so they rest flush with the edges at the corners of the board, and drill holes for a good sized bolt to pass through each corner of the board for mounting the secondary coil to the base. A piece of copper ribbon is soldered to the inside turn of the primary coil, and to the bottom of the secondary, winding, completing the coil construction.

The apparatus is now ready for connecting and operating. The wires are connected according to the diagram. For the sake of simplicity the rotating disc is omitted in the diagram of the spark gap. The spark gap motor is of course connected to the input line through a suitable switch. The wire from the secondary of the low frequency transformer

[*Continued on page* 151]

A Midget Superheterodyne

[*Continued from page* 126]

Speaker output is taken from the plate of the 33 tube and the 135-volt B battery tap. A jack is used to plug in the speaker and is installed in a grommet-insulated hole at the back of the sub-panel. The speaker, of the permanent-magnet type, should have an impedance of 7,000 ohms, or if lower, should be connected through a suitable matching output transformer.

A switch at the back of the potentiometer is inserted in the grounded negative, A and B leads and positive C leads to break all circuits when the set is turned off. One side of this switch leads to the three battery taps and the other side is soldered to the chassis. A Fahnestock clip is bolted directly to the chassis and is used to fasten the ground wire.

The 33 power tube has a 6-ohm rheostat in the positive filament lead for volume control. The other two tubes have 15-ohm fixed wire-wound resistors to cut the three volts supply down to two volts.

After double-checking for hook-up errors, insert the plug in the battery-supply socket and connect the filament batteries. If the tubes light when the switch is turned on, proceed to connect the other batteries, as well as ground, aerial and speaker.

Advance the volume and regeneration controls, with the 400-mmfd. oscillator padding condenser opened about halfway. All tuning should be done with a wooden screwdriver. The plates of the tuning condensers should be entirely enmeshed, so that the set will tune to the bottom of the band. Adjust the two trimmers on the i. f. transformer for the loudest hiss and crackle in the loudspeaker. These adjustments should preferably be made during the day.

After tuning the i. f. trimmers for the greatest noise, manipulate the oscillator padding condenser for the same results. When the peak is reached, the set should be near resonance. Slowly revolve the dial until a station is picked up. Adjustments may then be made on both the i. f. and oscillator trimmers for maximum volume and tone quality.

World Radio Battle Looms

[*Continued from page* 64]

communications, but now the smaller countries have developed their radio facilities and are demanding their place in the sun on the ground that each sovereign entity is entitled to its share of the valuable channels in the ether.

Lightning With Oudin Coil

[*Continued from page* 150]

is automotive high tension wire; that from the condenser should be special, heavily insulated neon sign cable, as should that also from the spark gap. GREAT CARE MUST BE TAKEN NEVER TO TOUCH THE LOW FREQUENCY TRANSFORMER. The condenser when charged will retain a considerable quantity of electricity for days, so it is well to "short" the connections for a second (with a well insulated metal rod) before touching them. The grounded connections may be of braided ribbon or other heavy uninsulated wire connected to a water pipe. This ground should be a water pipe, *never a gas pipe.* Under no circumstances should the coil be operated unless this ground is established.

The coil is now ready to be set in operation. Clip the wires from the condenser and the spark gap to convenient turns of the primary of the high frequency transformer, start the spark gap motor, and turn on the power. A loud crackling noise should be heard and streamers of fire seen darting from the discharge ball. Vary the number and position of the turns used in the primary of the high frequency transformer and perhaps alter the capacity of the condenser until maximum output is obtained. Be sure that all power is shut off when these adjustments are made, and discharge the condensers as mentioned above before touching anything metallic.

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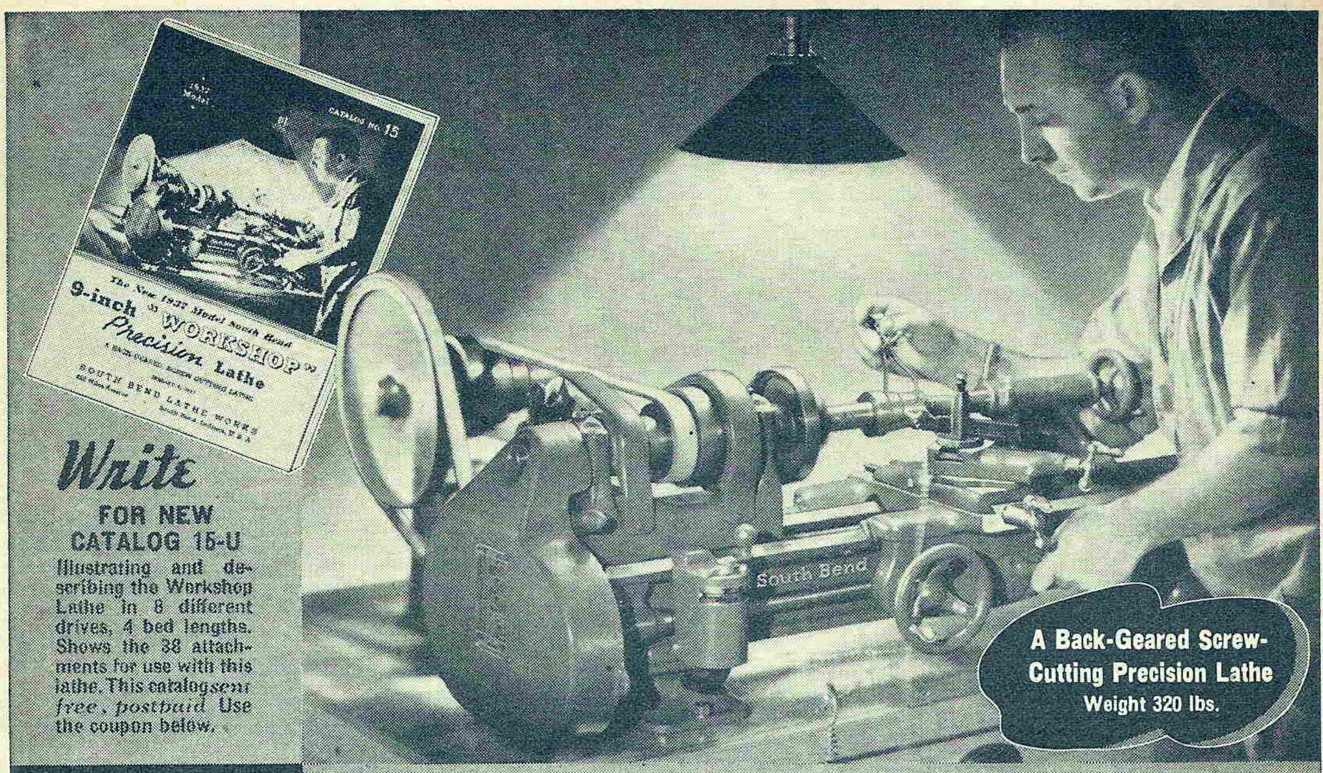
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SOUTH BEND *Precision* LATHES

Photographing Wild Animals

[Continued from page 132]

first rays of dawn arrive, so get up early the next morning and close it or the film will be fogged.

You will find that the small size photoflash bulb and a fine grain supersensitive film is the best combination. The small bulb lasts only 1-75 of a second, so the animal is not likely to be blurred on the resulting photograph. If more light is desired, two small bulbs in a double socket will do the trick. You will have to experiment to find the best stop opening to use. This varies of course with the distance which should range from one to six feet. If your camera does not have a double extension bellows for close-ups, an ordinary portrait lens is equally good.

Tapped Metal Accessories

[Continued from page 130]

nothing. When completed, they stand 6" high and will accommodate any number of books. As most of us do our reading at night they are very characteristic of the occasion.

The material used for the body of the owl and the base is of 18-gauge soft sheet steel. Lay out the patterns on cardboard, then transfer them to the steel, cut the pieces out with the tin snips and hammer one side of each piece with the planishing hammer to obtain the desired effect.

The lines are cut in with a blunt cold chisel while the feathers on the breast are made with an ordinary nail set held at an angle and tapped sharply.

It will be noted that the base is cut so that if the finished book ends are assembled properly, the two bases will slide close together even when only a few books are to be placed in them.

Drill small holes as shown in the pattern plan and assemble bases to uprights with No. 12 brass escutcheon pins. The owl's eyes are cut from aluminum or chrome plated metal so that they will shine brightly in the evening when the lights play on them.

The beak and the feet are cut out as shown from 22-gauge soft yellow brass. These are also riveted in place with No. 12 brass escutcheon pins. Two pieces of 3/16" round iron rod 1¼" long are required to form a perch for the owl feet which are then bent around them.

Paint the steel parts with a light coat of dead black paint, and let dry thoroughly, then burnish with a piece of fine emery paper, wearing away the paint, except in the deeper places. Glue a piece of black canton flannel to the base of each book end to prevent scratching the desk top.

Medieval bronzes made in the mysterious African Kingdom of Benin are so beautifully designed and executed that a German scholar has said: "Benevenuto Cellini himself could not have made better casts, nor anyone else before or since to the present day."

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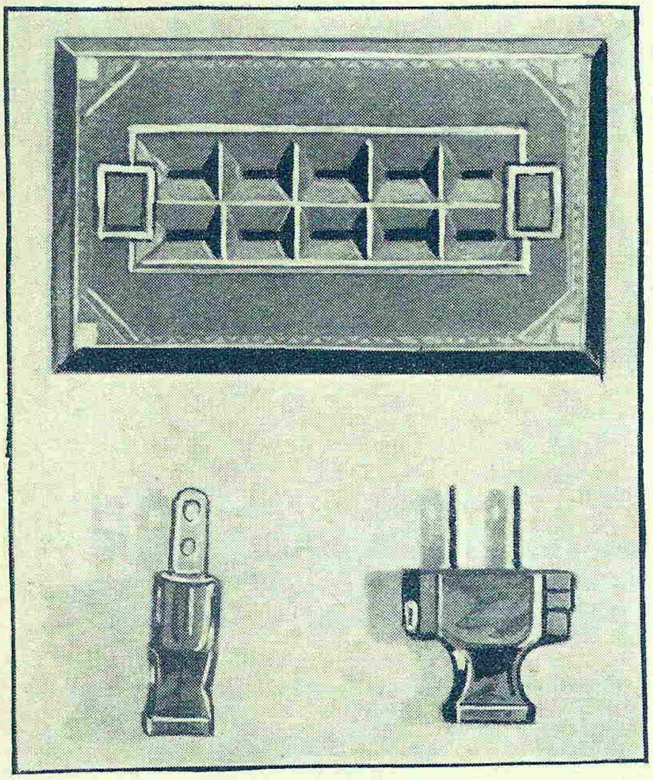

An electric wall receptacle will take five flat-type plugs. Made of bakelite with receptacle and plate of one piece. The new outlet fits any standard switch box. Permits several appliances to be used from the same outlet.

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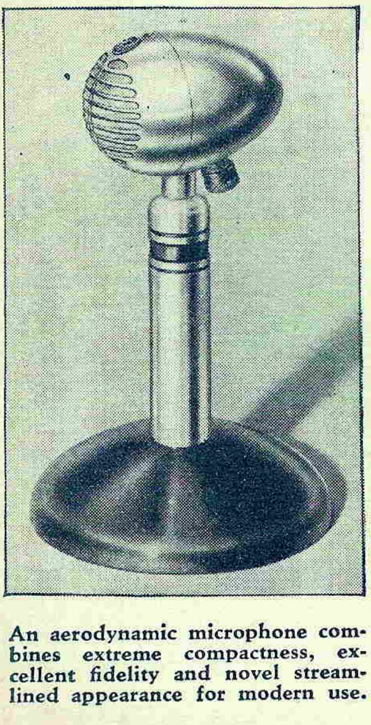

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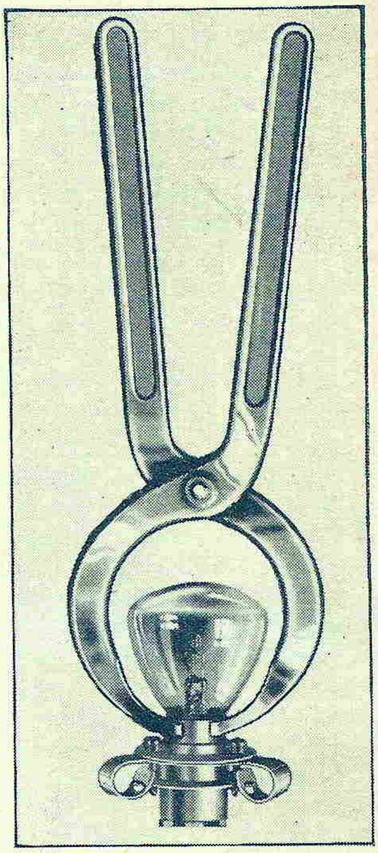
An automatic trap seal valve offers protection against dangers of sewer gas.

A heavy duty electric etcher.

An electric paper tester using an electric eye, showing variations in formation and structure.

An electric hand grinder having a 1/18 horsepower motor.



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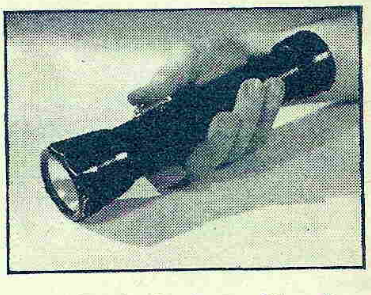

A flashlight having rubber lens frame and base offers protection against damage when it is dropped. Covering also prevents corrosion.

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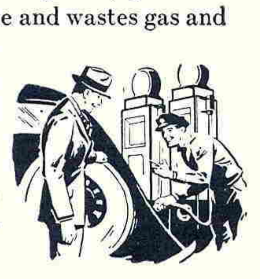

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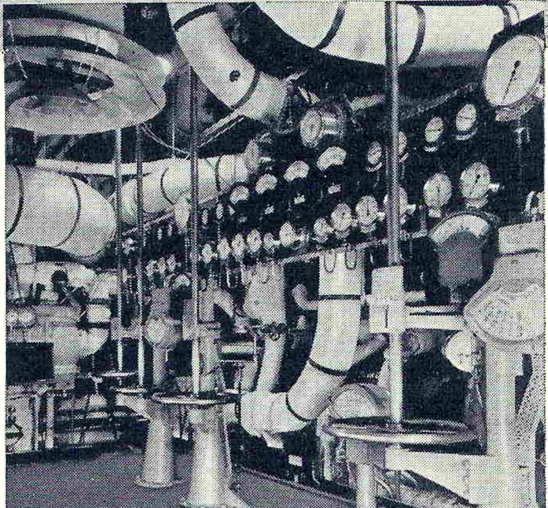

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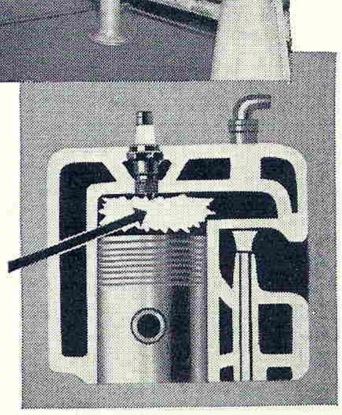

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